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ABSTRACT

This publication is designed to provide teachers with Grade 4 activities in mathematics that match the requirements of the North Carolina Standard Course of Study. The Grade 4 Mathematics Standard and related competency goals and objectives from the North Carolina Standard Course of Study and Mathematics Teacher Handbook are reproduced in the initial section. The remainder of the book is separated into six sections. The first section provides a week-by-week guide of activities for the classroom. The sheet for each week contains four facts the students are to review, a calculator exploration, eight mental math problems, a game of the week with accompanying worksheet, a problem for the week, a data exploration to be integrated with other subjects, and a question to discuss. The second section elaborates on the competency goals and objectives, and suggests activities to help attain each objective. The third section discusses an integrated approach to teaching mathematics and social studies. The approach is made up of ten segments that refer the teacher back to the activities provided in the week-by-week guide. Lesson plans are provided for each segment. The fourth section describes a year-long project called "We Like Calling North Carolina Home," designed to be a part of the ongoing bulletin board display in the classroom. The fifth section contains teacher-generated activities to be shared with teachers. The final section provides reproducible blackline masters as support material for activities in the book. (MDH)

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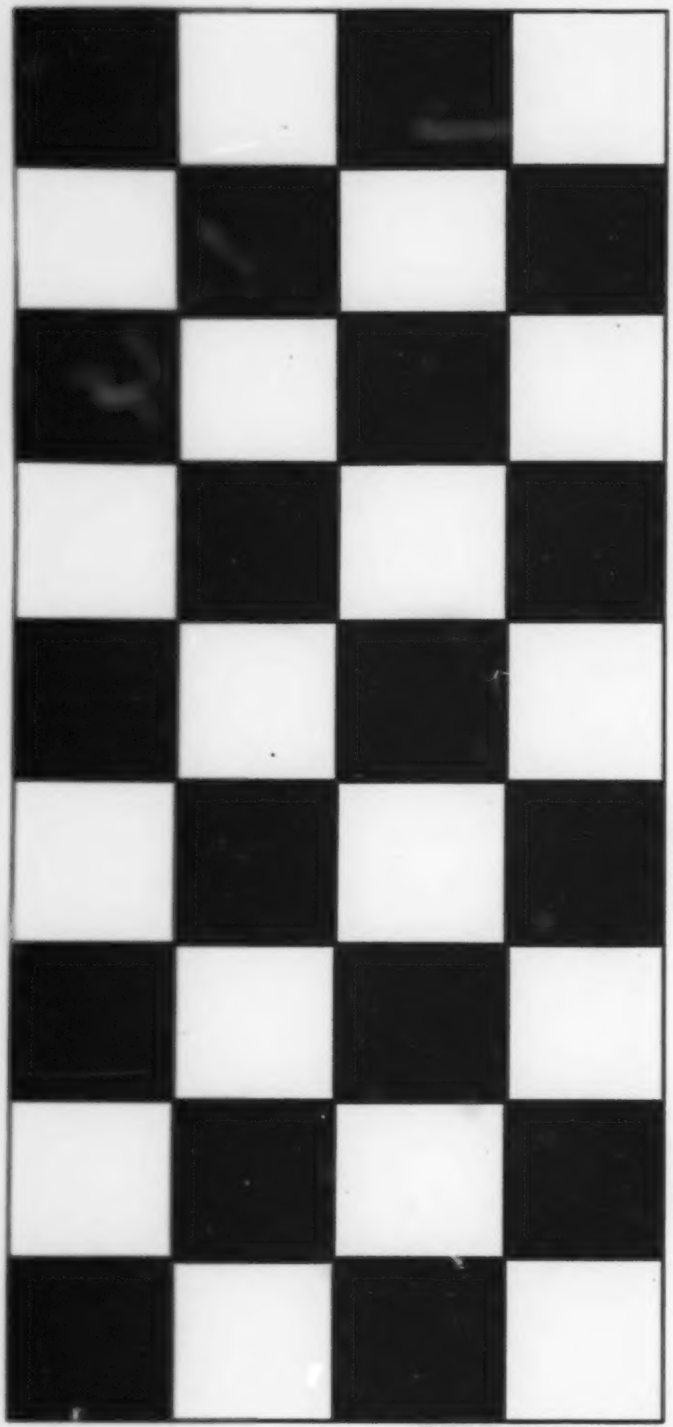

Strategies for Instruction in Mathematics

Mathematics Section

Division of Curriculum and Instruction
North Carolina Department of
Public Instruction

Bob Etheridge, State Superintendent

1993

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GRADE 4

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CURRICULUM AND INSTRUCTION

Strategies for Instruction in Mathematics

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GRADE 4

CURRICULUM AND INSTRUCTION

FOREWORD

Mathematics is the language of problem solving and a key to opportunity in a world economy. During the elementary years, students develop attitudes about themselves as learners and users of mathematics. They need to feel great confidence as they develop thinking and reasoning abilities along with mathematical knowledge.

Mathematics for all children in grade 4 should be active and enjoyable. Manipulative, "hands-on" activities that allow students to explore ideas and internalize concepts should dominate the instructional program. Process, content, and attitudes, which cannot be totally separated, are three important aspects of the mathematics curriculum. Activities must be at the appropriate developmental level for students, while at the same time challenging students to greater skills and understanding. The evaluation of student achievement in mathematics should reflect what students can do, explain, and record.

This publication is designed to provide teachers with grade 4 activities in mathematics which match the requirements of the *Standard Course of Study*. Most of the activities are appropriate for instruction as well as for evaluating student understandings. These activities encourage thinking and reasoning and focus on language activities as a component of the mathematics program. Taken as a whole, these strategies promote a broad, vigorous mathematics instructional program.

Bob Etheridge
State Superintendent
Department of Public Instruction

Winter, 1993

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Enthusiastic, dedicated professionals are always willing to share. During the past two years teachers have spent countless hours searching, brainstorming, writing, editing, and revising ideas and activities to put together this resource for all fourth grade teachers in North Carolina. We appreciate and thank each one of them.

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We invite your comments. Please address your letters to:

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NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS : GOALS FOR ALL STUDENTS

- *To value mathematics*
- *To be confident in their own abilities*
- *To be mathematical problem solvers*
- *To communicate mathematically*
- *To reason mathematically*

7

Standard Course of Study

Mathematics Grade 4

1. **Numeration, 0 through thousands**

    a. Demonstrate an understanding of the structure of the base ten system by estimating, rounding, comparing, and expressing numbers in a variety of forms.
    b. Interpret the multiple uses of numbers encountered in the real world.
    c. Use models to compare and find equivalent fractions and mixed numbers, relating symbols to the models.
    d. Model, record, and compare decimals, relating decimals and fractions.
    e. Recognize decimals and mixed numbers as an extension of the base ten system.
    f. Use mathematical language to describe fraction and decimal concepts.

2. **Geometry**

    a. Extend the investigation of plane and solid figures through illustrations and models, including computer graphics.
    b. Describe relationships between geometric models.
    c. Extend spatial sense through a variety of experiences, including geometric transformations.

3. **Patterns and Relationships**

    a. Describe mathematical relationships in the real world and patterns in other content areas.
    b. Use patterns to identify relationships within the number system, including numerical operations.
    c. Identify the relationships of pairs of numbers, giving additional examples which satisfy the rule.
    d. Use intuitive methods, inverse operations, and other mathematical relationships to find solutions to open sentences.

Standard Course of Study *continued on next page*

4. Measurement

- a. Identify relationships within the same measurement system, and measure using the appropriate tool.
- b. Explore elapsed time using clocks or calendars and solve time related problems.
- c. Use appropriate language and proper notation to express, and compare money amounts.
- d. Demonstrate an understanding of the concepts of area and perimeter and how various formulas are developed.
- e. Estimate answers; solve routine and non-routine measurement problems.

5. Problem Solving and Mathematical Reasoning

- a. Develop an organized approach to solving routine and non-routine problems.
- b. Use problem solving methods to investigate mathematical content and to formulate problems.
- c. Communicate an understanding of problems through the use of strategies, technology, and a discussion of alternate strategies in solving routine and non-routine problems.
- d. Estimate and evaluate solutions to problems, verifying and interpreting results with respect to the original situation.

6. Graphing, Probability and Statistics

- a. Read and interpret a variety of data displays.
- b. Formulate and solve problems that involve collecting, displaying, and interpreting data.
- c. Describe positions on graphs using coordinates.
- d. Describe possible outcomes in a given situation.

7. Computation

- a. Demonstrate proficiency with addition and subtraction where written algorithms are applied within the context of problem solving.
- b. Explain/ model processes of multiplication and division, demonstrating their relationship.
- c. Demonstrate proficiency with multiplication and division facts/ tables through 10.
- d. Solve multiplication problems with 1 to 3-digit factors and division problems related to multiplication facts.
- e. Choose appropriate operations and methods for solving real world applications, including employing a variety of strategies - estimation, mental computation, pencil and paper, calculators and computers.
- f. Add and subtract decimals using models and pictures, recording results.

GRADE 4: COMPETENCY GOALS AND OBJECTIVES

Competency Goal 1: The learner will identify and use rational numbers.

1.1 Within meaningful contexts express numbers (up to 6-digits) in a variety of ways, including oral and written forms using standard and expanded notation.
1.2 Use models to explain how the number system is based on 10 and identify the place value of each digit in a multi-digit numeral.
1.3 Compare and order numbers less than one million.
1.4 In real world situations, discuss when it is appropriate to round numbers; round numbers to an appropriate place.
1.5 Use regions, sets, number lines and other concrete and pictorial models to represent fractions and mixed numbers; relate symbols to the models
1.6 Use models and pictures to compare fractions including equivalent fractions and mixed numbers; explain the comparison.
1.7 Use models and pictures to demonstrate the value of decimal numerals with tenths and hundredths; show decimals as an extension of the base 10 system.
1.8 Use models and pictures to compare decimals (wholes, tenths, hundredths) which relate to real world situations; record and read results.
1.9 Use models and pictures to establish the relationship between whole numbers, decimals, and fractions; describe using appropriate language.

Competency Goal 2: The learner will demonstrate an understanding and use properties and relationships of geometry.

2.1 Use manipulatives, pictorial representations, and appropriate geometric vocabulary (e.g. sides, angles, and vertices) to identify properties of polygons and other two-dimensional figures.
2.2 Use manipulatives and appropriate geometric vocabulary (e.g. edges, faces, and vertices) to identify properties of polyhedra and other three-dimensional figures.
2.3 Explore turns, flips, and slides with figures.
2.4 Make models of line segments and their midpoints, intersecting lines, parallel lines, and perpendicular lines, using materials such as geoboards, paper-folding, straws, and computer graphics.
2.5 Use a variety of models to illustrate acute, right, and obtuse angles.
2.6 Relate concrete models of lines and angles to pictorial representations and to examples in the environment.

continued on next page

Competency Goal 3: The learner will demonstrate an understanding of patterns and relationships.

3.1 Identify and describe mathematical patterns and relationships that occur in the real world.
3.2 Demonstrate or describe patterns in geometry, data collection, and arithmetic operations.
3.3 Identify patterns as they occur in mathematical sequences.
3.4 Extend and make geometric patterns.
3.5 Given a table of number pairs, find a pattern and extend the table.
3.6 Use patterns to make predictions and solve problems; use calculators when appropriate.
3.7 Use intuitive methods, inverse operations, and other mathematical relationships to find solutions to open sentences.

Competency Goal 4: The learner will understand and use standard units of metric and customary measure.

4.1 Select an appropriate unit and measure length (inches, feet, yards, centimeters and meters).
4.2 Weigh objects using appropriate units and tools (ounces, pounds, grams, kilograms).
4.3 Measure capacity with appropriate units (milliliters, teaspoons, tablespoons, cups, pints).
4.4 Identify a model that approximates a given capacity unit (cup, quart, gallon, milliliter, and liter).
4.5 Estimate the number of units of capacity in a given container and check the estimate by actual measurement.
4.6 Compare units of length, capacity, and weight within the same system.
4.7 Explore elapsed time problems using clocks and calendars.
4.8 Use appropriate language and proper notation to express and compare money amounts.
4.9 Use models to develop the relationship between the total number of square units and the length and width of rectangles. Measure perimeter and determine area of rectangles using grids.
4.10 Find the approximate area of regular and irregular figures using grids.
4.11 Formulate and solve meaningful problems involving length, weight, time, capacity, and temperature; and verify reasonableness of answers.

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Competency Goal 5: The student will solve problems and reason mathematically.

5.1 Develop an organized approach to solving problems involving patterns, relations, computation, measurement, geometry, numeration, graphings, probability and statistics.
5.2 Communicate an understanding of a problem through oral and written discussion.
5.3 Determine if there is sufficient data to solve a problem.
5.4 In solving problems, select appropriate strategies such as act it out, make a model, draw a picture, make a chart or graph, look for patterns, make a simpler problem, use logic, work backwards, guess and check, break into parts.
5.5 Estimate solutions to problems and justify.
5.6 Solve problems by observation and/or computation, using calculators and computers when appropriate.
5.7 Verify and interpret results with respect to the original problem. Discuss alternate methods for solutions.
5.8 Formulate engaging problems including ones from every day situations.

Competency Goal 6: The learner will demonstrate an understanding and use of graphing, probability, and statistics.

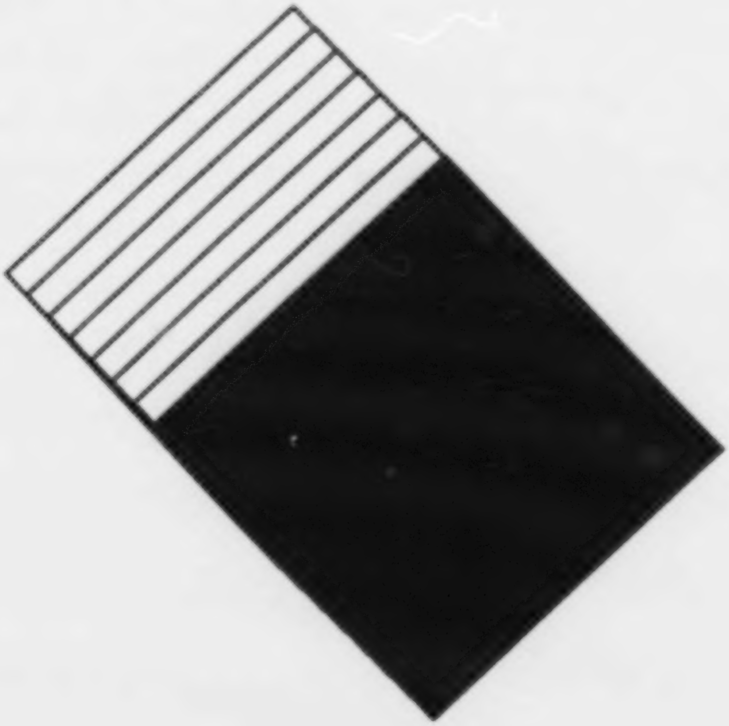
6.1 Collect, organize, and display data from surveys, research, and classroom experiments, including data collected over a period of time. Include data from other disciplines such as science, physical education, and social studies.
6.2 Formulate questions and interpret information orally and in writing including main idea, from charts, tables, tallies and graphs (bar, line, stem and leaf, pictographs, circle).
6.3 As a group, display the same data in a variety of ways; discuss advantages and disadvantages of each form, including ease of creation and purpose of graph.
6.4 Explore range, median, and mode as ways of describing a set of data.
6.5 Name the ordered pair of a point on a grid; plot positions named by ordered pairs on a coordinate grid.
6.6 Use ordered pairs in a variety of engaging situations (e.g. map reading, treasure hunts, games, and designs).
6.7 Show all possible ways to sequence a given set of objects; list and explain all possible outcomes in a given situation.

continued on next page

Competency Goal 7: The learner will compute with rational numbers.

7.1 Estimate results and solve meaningful problems involving addition and subtraction of multi-digit numbers, including those with two or three zeros. Use a calculator in situations involving large numbers (more than 4-digits) or more than 3 addends.
7.2 Use mental math skills to approximate answers and to solve problems, using strategies such as estimation and clustering.
7.3 Explain multiplication through the use of various models or by giving realistic examples.
7.4 Model and explain division in a variety of ways such as sharing equally, repeated subtraction, and rectangular arrays.
7.5 Memorize multiplication facts and relate to division facts.
7.6 Demonstrate with models special properties of multiplication: commutative, associative, and identity; and the relationship of multiplication and division.
7.7 Estimate results; then solve meaningful problems using the multiplication algorithm with 1- digit times 1- to 3-digits and two 2-digit numbers where one is a multiple of 10.
7.8 Solve division problems with single-digit divisors and no renaming.
7.9 Estimate results; then use calculators and computers to solve problems involving multiple-digit numbers.
7.10 Estimate and use models and pictures to add and subtract decimals, explaining the processes and recording results.

WEEK-BY-WEEK ESSENTIALS



A NEW CATECHISM

Who is the pupil?
A Child of God, not a tool of the state.

Who is the teacher?
A guide, not a guard.

Who is the principal?
A master of teaching, not a master of teachers.

What is learning?
A journey, not a destination.

What is discovery?
Questioning the answers, not answering the questions.

What is the processs?
Discovering ideas, not covering content.

What is the goal?
Opened minds, not closed issues.

What is the test?
Being and becoming, not remembering and reviewing.

What is a school?
Whatever we choose to make it.

Dr. Lola May
Winnetka Public Schools
Evanston, IL

Week-by-Week

Essentials

Facts of the Week

Each week there are four number facts for the students to review. Once a week you may wish to have students choose one of the facts and create a story in their journals that the equation will illustrate. By keeping the stories together, you will be able to evaluate the students' understandings of operations as well as monitor their growth in writing skills.

Write a Story

Each week there is a calculator exploration. The goal is for students to learn to use the calculator as a tool to help them become better thinkers and problem solvers. If your goal is computational drill, calculators may not be appropriate. However, if the goal is problem solving, applications, or data activities, calculators should be available for all students.

Calculator Exploration

If you are using more than one kind of calculator in the classroom, help students explore to see which ones function in the same manner.

There are 36 Week-by-Week Essentials in this section. They are designed to be used in order; however, some activities may relate to seasonal ideas and may need to be used in weeks other than the designated one.

There will be many opportunities for students to write about their activities and their ideas in these mathematics lessons. Consider having students keep a daily journal (log) with some days devoted to writing about math, some social studies, some science, and some literature, as well as other prompts. Throughout these essentials there are many prompts which relate mathematical thinking to other parts of the curriculum.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

Each of the eight questions relates to a specific math concept.

1. *Numeration, place value, multiples of 10's and 100's*
2. *Strings of operations*
3. *Rounding and estimation*
4. *Addition/Subtraction*
5. *Multiplication/Division*
6. *Money/Time*
7. *Measurement*
8. *Application/General information*

Even though studies indicate that about three-fourths of the mathematics we use daily is either estimation or mental computation, traditional elementary school mathematics programs have not emphasized strategies for helping children compute mentally. We must help students develop good mental math skills through daily and weekly practices.

You may wish to begin the year by making a mental math booklet which contains 36 half-pages. On the front of the pages students number from 1 to 8. On the back, they record the number correct and write any notes to help them in future mental math sessions. At the end of each grading period, let students keep track of their progress by graphing the number answered correctly each week. Share with parents at conference time.

Responding to oral prompts may be difficult for students in the beginning. Repeat each question only once. In question two call out the numbers slowly so that students can "hold" the number in their heads while waiting for you to call out the next operation. Note: because numbers are called out one at a time, operations will be performed as they are called out, rather then following algebraic rules in these problems.

Make children aware of strategies for computing mentally and encourage them to find shortcuts that work for them. For example, 90 - 11 could be thought of as 90 - 10 (80), and then subtract 1 more (79). Talk about the shortcuts that work best for you and let students discuss those they might use. If children as a group are having trouble, you may wish to use manipulatives to help students visualize.

Game of the Week

Each week there is a number facts game for helping students learn the facts. In many cases, the games relate to North Carolina in some way. By playing the games each week, students will be reinforced continually in their efforts to memorize the facts. Most games are designed for two players; directions are on the gameboards.

You may wish to spend time early in the year establishing general guidelines for playing the number facts games. For example, whenever playing a game that uses dice, the players must roll them into a box top. If the dice go out of the top, the player loses a turn.

When working with games that use cards, children should shuffle the cards before starting each game. When the stack is used up, reshuffle the cards and continue the game. In many of the games either cards or dice (random number generators) can be used.

Establish a procedure for beginning. For example, the player who draws the highest card or rolls the highest number goes first. Assign a specific place to store materials and set up a system of keeping track of who is being successful (in both social and mathematical skills).

Gameboards may be reproduced on heavy paper, laminated, and used all year. The games should be introduced by the teacher, modeling how to play with the total class or allowing two students demonstrate.

Problem for the Week

Students can display their solutions on a problem solving bulletin board. They will enjoy adding their own brain teasers and non-routine problems for others to solve. Use Superstars to challenge students and to encourage higher order thinking.

Students need to develop good mental imagery skills and many problems of the week have spatial visualization as a major goal. Hands-on activities which help children picture numbers and number concepts are important. Developing visual skills may help students internalize concepts. For example, if students have a well-developed mental picture of 1 centimeter and 1 inch, then comparing 4 inches with 2 centimeters becomes a visual process, not a process of converting from one unit to the other.

Encourage students to talk about how they solved each problem. Wrong answers need to be explored, and computational errors need to be diagnosed and corrected. Talking about processes is a must in developing confident problem solvers as well as mental math skills. Students will discover there is rarely just one way to solve a problem.

Data Exploration

Formulating questions and accurately gathering information are skills applied in all content areas. Note similar goals in science, communication skills, math, and social studies.

To Discuss

There are a variety of questions for discussion in this section. Many lend themselves to journal writing. Students' interests will suggest the follow-up questions.

Data explorations are investigations which integrate social studies and mathematics. Some may require outside research and you may need to adopt these explorations for your students. Many lend themselves to extended projects for individuals or small groups. Cooperative learning groups are appropriate for all of these explorations.

These weekly investigations relate to goal 6 - understanding and using graphing and statistics - and also address the social studies skills goals:

1. The learner will identify and define problems and suggest ways of solving them.
2. The learner will locate and gather information.
3. The learner will evaluate information.
4. The learner will organize and analyze information and draw conclusions.
5. The learner will use maps and globes.
6. The learner will develop a sense of time and chronology.

As students become more sophisticated in their ability to collect, organize, and display data in a variety of ways, the goal is to help them interpret the data and make inferences, to become decision makers.

Week 1

Facts of the Week

7 + 6 = 13　　13 − 7 = 6

7 × 4 = 28　　28 ÷ 7 = 4

Write A Story

Calculator Exploration

You can only press these keys: $\boxed{6}$ $\boxed{\text{(division)}}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{+}$ $\boxed{=}$. Make your display read 7. Keys can be used more than once. Write a description of what you have done.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 10 more than 80
2. 5 + 3 + 12 − 2
3. Is 781 nearer 700 or 800?
4. 15 + 40
5. 5 × 3
6. Value of 3 dimes and 2 nickels.
7. Which is longer — foot or yard?
8. Number of sides on a hexagon

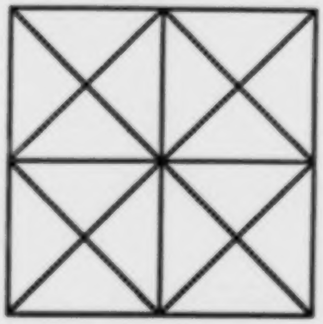
Game of the Week

WIPE OUT

The gameboard is on the back of this page. The game is a strategy game which practices addition facts. It is explained completely in the integrated lesson plan section page 5. Later, pairs of students can play alone by taking turns rolling the dice and removing a cube from their gameboard only.

Problem For the Week

How many different ways can you color one-half of this design?



Data Exploration

Survey students' place of birth: city/county/state/country. Compile the information and display using a Venn diagram.

Venn diagrams are used as graphic organizers to show intersecting sets of things that have been classified.

To Discuss

How are different kinds of maps made? What are the advantages and disadvantages of the different projections?

What map could you create for your school area?

Place 15 markers on the gameboard; take turns rolling 2 dice and using any operation to remove a marker. Winner is first to clear the board. (See integrated plans for alternate rules.)

WIPE OUT !

1	2	3	4	5	6
7	8	9	10	11	12

WIPE OUT !

1	2	3	4	5	6
7	8	9	10	11	12

Week 2

Facts of the Week

7 + 7 = 14
14 − 7 = 7
4 × 4 = 16
16 ÷ 4 = 4

Write A Story

Calculator Exploration

What number should be placed in the box to make the computation correct? Is there a way to shortcut the trial and error?

341 − ☐ = a number between 115 and 120.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 10 less than 40.
2. 2 × 3 + 8 − 1
3. Round to nearest ten: 28.
4. 67 − 4
5. 8 × 2
6. Value of 2 dimes and 4 pennies.
7. Number of months in one year.
8. Number of sides on 3 triangles.

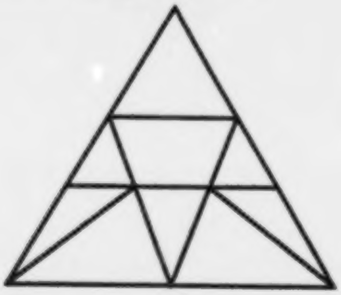
Game of the Week

Blackbeard's Treasure Box

This game uses coordinates and provides additional practice similar to Find the Ferret (see blackline masters). For additional coordinate activities, see the sixth competency goal and objectives.

Problem For the Week

How many triangles can you find?
Create a new triangle puzzle.



Data Exploration

Using a North Carolina road map, locate ten major cities in North Carolina. Identify the coordinates on the map for each city. Can you identify their location as to latitude and longitude. How are latitudes and longitudes divided into smaller units?

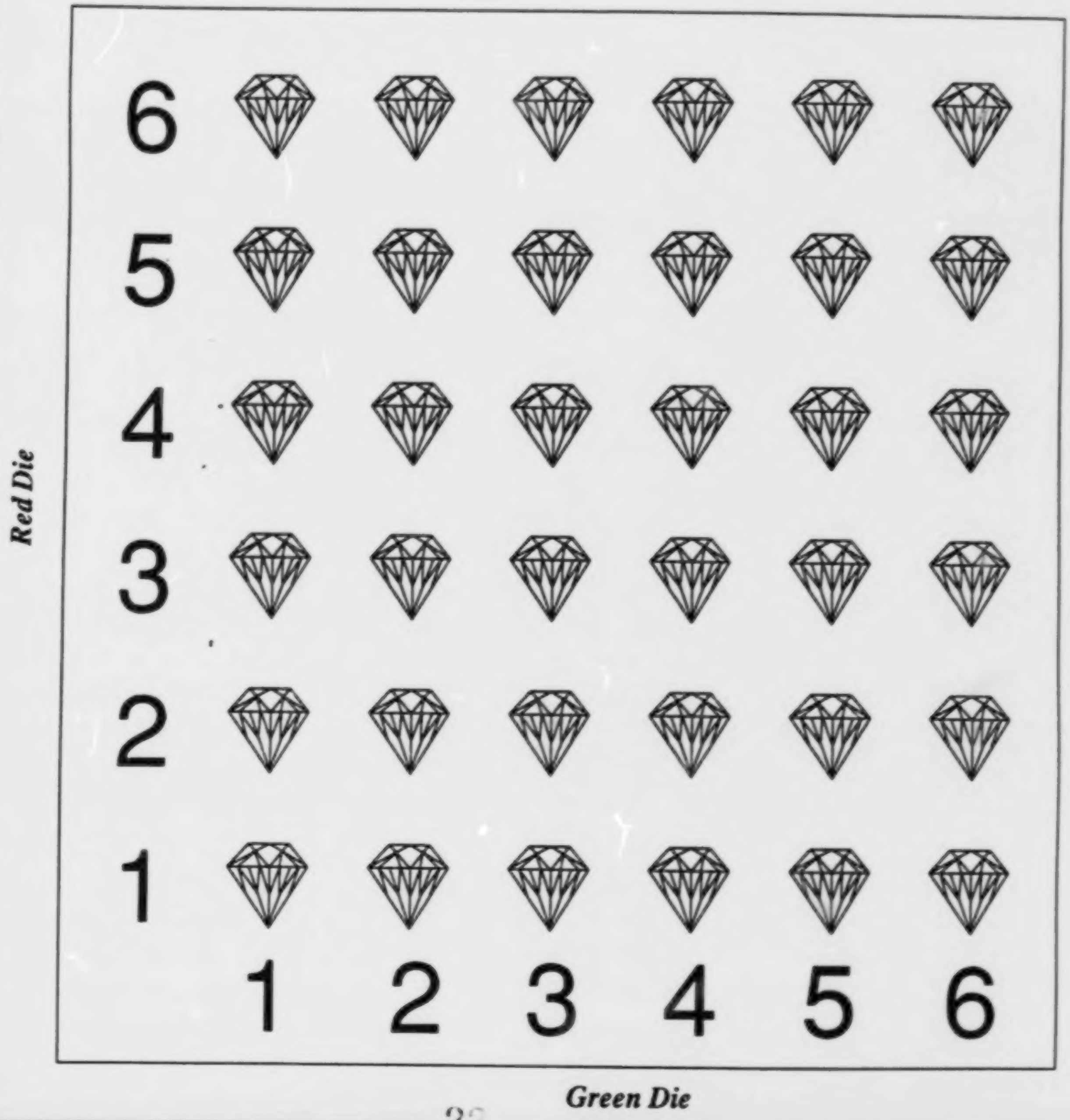
To Discuss

Why is there a legend on a map? What does the legend on the N.C. road map tell you?

What symbols might change for the maps in the year 2000? Why?

Blackbeard's Treasure Box

Directions: You and your partner need a red die and a green die, 10 markers each (players have different colors), and a gameboard. Players take turns rolling the dice. If, for example, a green 2 and a red 3 are tossed, the player would cover the gem at 2, 3. If a player tosses and the gem at that place is taken, the player loses that turn. The first to get four in a row wins.
Variation: Players may win by seeing who can cover four adjacent gems to form a box.



Week 3

Facts of the Week

6 + 8 = 14
14 – 8 = 6
8 × 3 = 24
24 ÷ 8 = 3

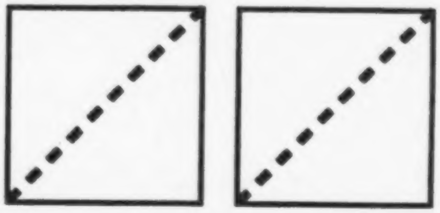
Write A Story

Calculator Exploration

Find two numbers whose difference would be 153.

Problem For the Week

Use four right triangles cut from two squares. How many different shapes can you create? (No holes in the middle; edges must match.)



Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 10 more than 53
2. 6 + 5 + 4 - 3 + 2
3. Is 585 nearer 500 or 600?.
4. 7 + 13
5. 9 × 0
6. If it is 3:20 now, what time will it be in 5 minutes?
7. Number of feet in a yard
8. Double 13

Data Exploration

Is there a favorite fast food of students in your class? In the fourth grade? Decide as a class how you will gather the data in your room and then in the entire fourth grade. Make two different bar graphs to display your findings. Write a report on the data to share with other students.

Game of the Week

Pamlico Pirates

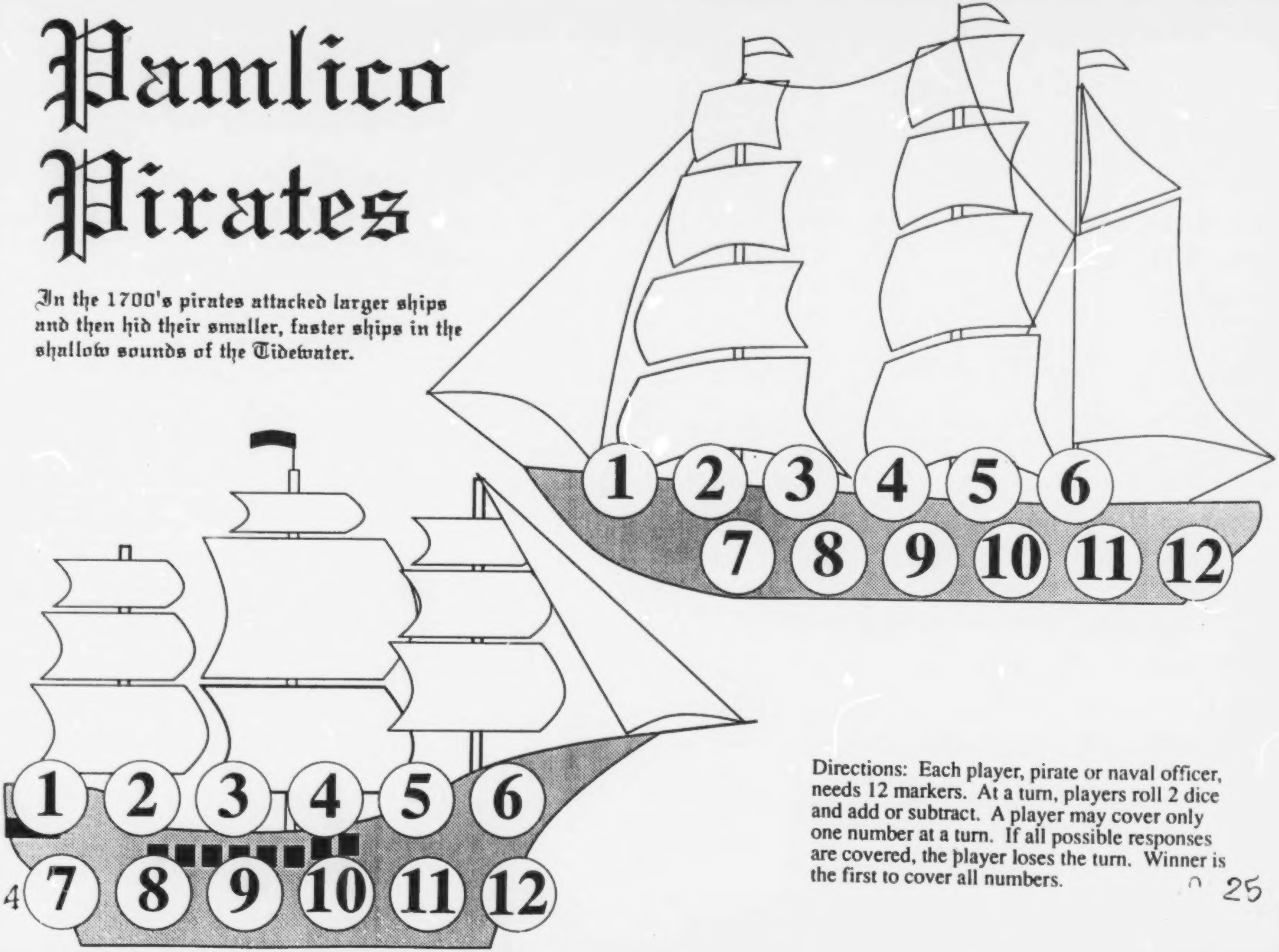
This week's game continues the review of addition and subtraction of numbers generated by rolling 2 dice. Partners choose to use the pirate's or the naval officer's ship for their gameboard.

To Discuss

Using your school as a starting point, where might your destinations be if you traveled one hour in any direction?

Pamlico Pirates

In the 1700's pirates attacked larger ships and then hid their smaller, faster ships in the shallow sounds of the Tidewater.



Directions: Each player, pirate or naval officer, needs 12 markers. At a turn, players roll 2 dice and add or subtract. A player may cover only one number at a turn. If all possible responses are covered, the player loses the turn. Winner is the first to cover all numbers.

Facts of the Week

$6 + 6 = 12$ $12 - 6 = 6$

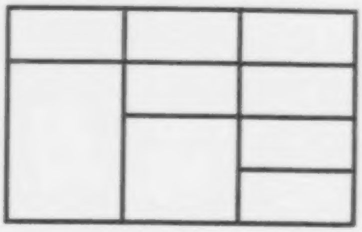
$3 \times 3 = 9$ $9 \div 3 = 3$

Write A Story

Week 4

Problem For the Week

How many different rectangles are there?
Find a way to record your results.



Calculator Exploration

If I could afford to present you with one dollar for your first birthday, two dollars for your second birthday, four dollars for your third birthday, and continue doubling the dollars for each birthday until your tenth birthday, how much would I owe you?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 400 more than 300
2. $2 \times 5 - 3 + 1 + 4$
3. Round to nearest ten: 62
4. $24 - 9$
5. 9×4
6. $1.50 less 2 quarters
7. 20 minutes after 6:10
8. Number of days in September and October

Data Exploration

Determine the number of interstate highways in North Carolina. Rank them according to their length in North Carolina and display the information on a chart. On a different chart tell the total length of these interstates.

Where will you find this information?

Game of the Week

Bump It

This game practices addition facts to 18. For even more fun, add two extra sets of 4 through 9 cards into your *Bump It* decks.

To Discuss

How many sides does an apple have?
Why do you think this?

Early North Carolina settlers as well as current citizens prepare apples in many ways. Have an "apple recipe sampling day."

Bump-It Addition

Materials: Gameboard, markers of 2 different colors, 4 sets of cards 1–9.

3	8	11	10	14	7
6	10	15	9	17	5
12	2	13	12	14	16
9	16	8	14	11	6
12	4	15	10	16	13
18	13	7	9	8	11

Directions: Shuffle and divide cards into 2 stacks. Draw a card from each stack, add and place marker on answer. If square has an opponent's marker on it, player may "bump" marker off. Game ends when all cards are used. Winner is player with most markers on board.

Week 5

Facts of the Week

8 + 7 = 15
15 − 8 = 7
6 × 6 = 36
36 ÷ 6 = 6

Write A Story

Calculator Exploration

Using only the 5, 3, −, = keys get 20. Keys can be used more than once. How did you do this?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 20 less than 67
2. 7 + 20 − 3 + 4
3. What hundred is 371 closest to - 300 or 400?
4. 85 + 9
5. 20 ÷ 4
6. Value of 3 quarters and 2 dimes.
7. Number of inches in 1 foot.
8. How many apples in 2 dozen?

Game of the Week

Top of the Rock.

This game focuses on 3 addends and 2-step equations. You and your partner will each need a gameboard and a pencil. Challenge: If the numbers on the flags were 6, 5, 3, and 1, how many of the sentences could you complete?

Problem For the Week

You are a pioneer going from Murphy to Manteo. How long will it take? What will be your route? What will you take with you and how will you travel? Write journal entries for three days of your trip to tell about your adventures.

Data Exploration

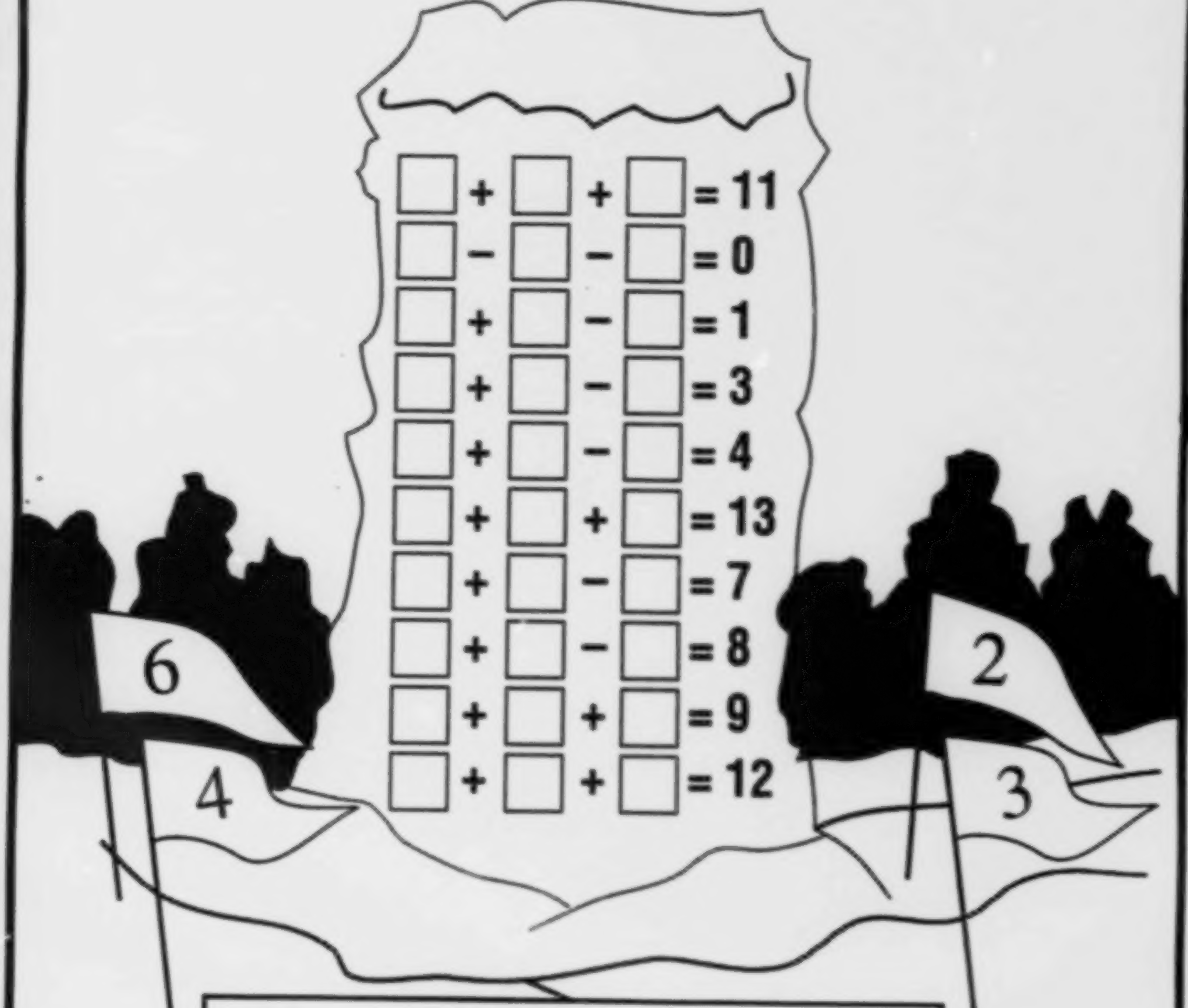
Find the time for each student to run a quarter of a mile. Collect data and determine the class average. (Use a calculator.) Using class average, how long would it take the "typical" student to run from Manteo to Murphy?

(You might wish to talk with students about what measure of central tendency would be most appropriate to use- mean, median, or mode. "Typical" could be any of these.)

To Discuss

Which contains more money, a milk carton filled with dimes or a milk carton filled with half dollars? Justify your choice.

TOP
OF THE
ROCK



☐ + ☐ + ☐ = 11
☐ − ☐ − ☐ = 0
☐ + ☐ − ☐ = 1
☐ + ☐ − ☐ = 3
☐ + ☐ − ☐ = 4
☐ + ☐ + ☐ = 13
☐ + ☐ − ☐ = 7
☐ + ☐ − ☐ = 8
☐ + ☐ + ☐ = 9
☐ + ☐ + ☐ = 12

Directions: Be first to reach the top of Chimney Rock! You must use any three of the flag numbers to correctly fill in each equation. The player with the greatest number of correct solutions wins the game.

Week 6

Facts of the Week

$6 \times 3 = 18$ $18 \div 6 = 3$

$9 + 6 = 15$ $15 - 9 = 6$

Write A Story

Calculator Exploration

How old will you be if you live 1,000 weeks?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write four thousand three hundred
2. 21 − 5 + 3 + 3
3. Round to nearest ten cents: 82¢.
4. 120 − 3
5. 45 + 9
6. Jane had 3 quarters. She spent 40 cents. How much does she have left?
7. Number of days in 3 weeks
8. 1/2 of 46

Game of the Week

Building Bonner Bridge

Students use 3 addends to find sums of 20. But be careful! When two play on the same gameboard, there are strategies for blocking one's opponent.

Problem For the Week

List all the possible combinations of $5.00 using 10 or fewer bills or coins.

Data Exploration

Count the number of counties in each of the three North Carolina regions. Graph information on a circle graph. To make a circle graph, begin with a strip with one hundred blocks. Use green to represent coastal plains counties, yellow—the piedmont, and brown—the mountains counties. Color a square for each county and roll the tape into a circle. From the center of the circle, draw a radius to the ends of each color section.

To Discuss

Why is a manhole cover round instead of square? Why is the top of a fire hydrant pentagonal? Can you think of other times when shape is important in something's design?

Building Bonner Bridge

9	9	9
3	8	7
8	4	4
9	2	8
9	8	7
6	9	5
5	7	2
9	9	2
7	7	7
8	6	4
7	6	9
7	7	7
6	6	8
5	9	6
9	7	4

Directions: You and your partner need a different colored pencil and a gameboard. The object of the game is to connect three numbers (one number from each column) that sum to 20. The line segments that join the numbers must be the same color and must be drawn diagonally. **Horizontal line segments will not be allowed. No line segments may cross.** Players work at the same time and may intentionally block their opponents. When all possible moves have been made, the winner is the player with the most 20s.

TARGET

20

Week 7

Facts of the Week

7 × 6 = 42
42 ÷ 7 = 6
7 + 9 = 16
16 − 7 = 9

Write A Story

Calculator Exploration

I am thinking of a number. When I add 55 to it and then multiply by 2, I get 310. What is my number?

I am thinking about one number. If I multiply it by itself four times I get 625. What is my number?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 30 less than 58
2. 5 × 2 + 3 − 4
3. Round to ten: 73
4. 25 + 15
5. 27 ÷ 9
6. 20 minutes after 7:45
7. Number of ounces in 2 pounds
8. Double 21

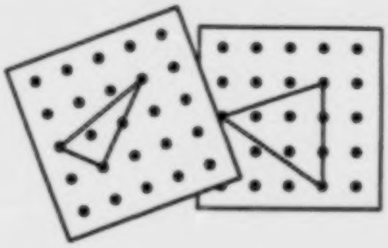
Game of the Week

Outer Banks Round-Up

This game has students subtracting from 3 different starting numbers. Two students write on the same gameboard. You can create additional game sheets by changing the starting numbers to 10, 12, 13, or 16.

Problem For the Week

Using a geoboard, how many different size right triangles can you make? Find a way to record this.



Data Exploration

Using a large North Carolina political map, cut apart the counties. Group these counties by size: small, medium, and large. Show results using the cut apart counties on a pictograph.
Variation: Have different students cut, group, and display counties in different manners.

To Discuss

All senators and representatives in North Carolina do not receive the same amount of salary per year. Why? Do you think this is fair? Create some sort of data display which shows salary differentiation and helps to explain the situation.

OUTER BANKS ROUND UP!

Remove aces and face cards from a regular deck of cards. Shuffle cards. Each player will draw one card and subtract from the target number given on each game. Record the answers on the game sheet.

15 GAME	NAME	NAME
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

The winner is the player who has the lowest total score for the ten rounds.

11 GAME	NAME	NAME
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

14 GAME	NAME	NAME
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Week 8

Facts of the Week

$3 \times 4 = 12$ $12 \div 3 = 4$

$8 + 9 = 17$ $17 - 8 = 9$

Write A Story

Calculator Exploration

Calculate these equations: $9 \times 9 = \mathbf{n}$, $9 \times 99 = \mathbf{n}$, $9 \times 999 = \mathbf{n}$, $9 \times 9999 = \mathbf{n}$. Can you predict $9 \times 99999 = \mathbf{n}$? Use your calculator to check your prediction.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write five thousand two hundred seven
2. $12 + 5 + 11 - 3$
3. Round to nearest dollar: $4.71
4. $16 + 8$
5. $16 \div 8$
6. 15 minutes before 8:00
7. Number of ounces in 4 cups
8. 1/2 of 44

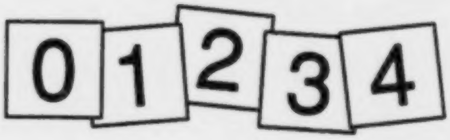
Game of the Week

Research Triangle Hop

This is a problem solving game that can be played in groups of 2 to 5. It focuses on using 3 addends to reach a designated sum.

Problem For the Week

How many different ways can you use these 5 digits (each number only once) and any operation to make 24?



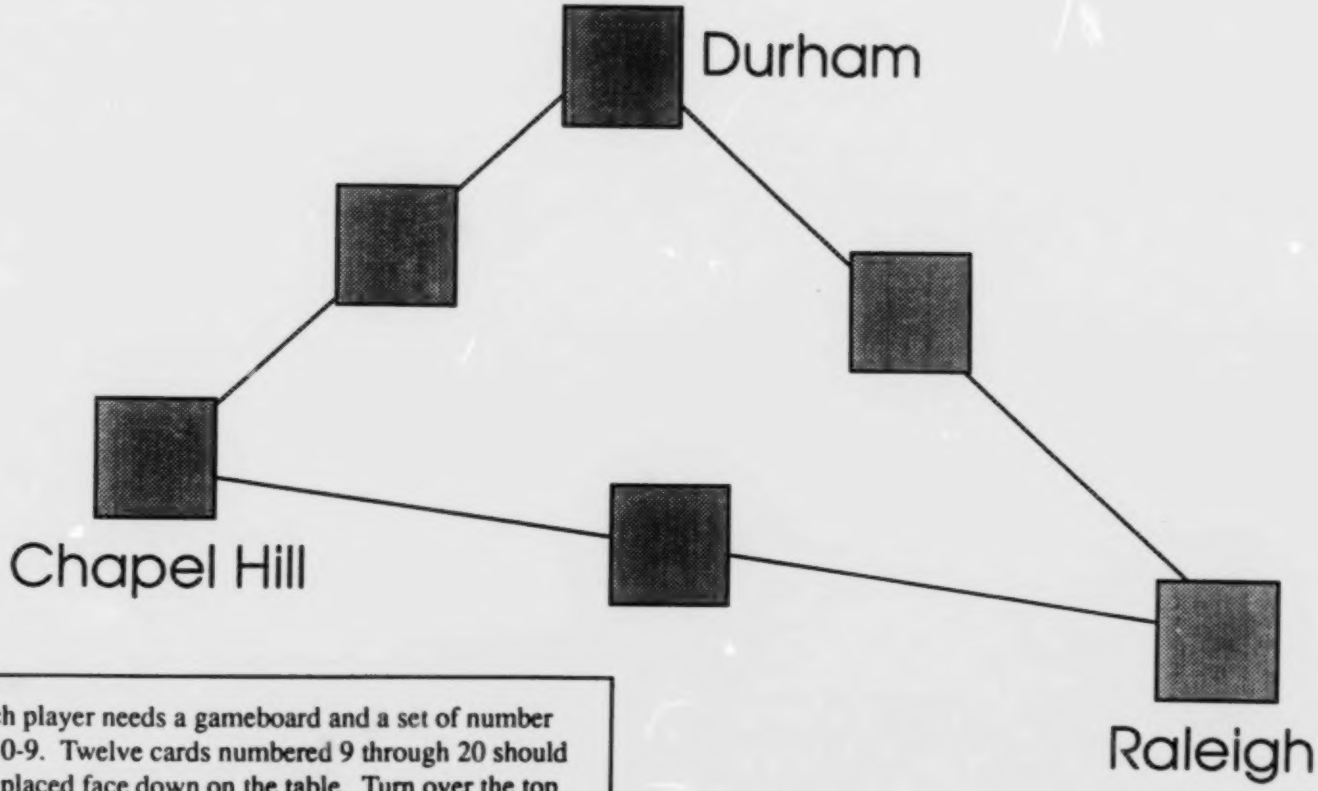
Data Exploration

Brainstorm ways in which a region's counties could be organized. (For example, alphabetize, square miles, date of origin, rural or urban, etc.) Choose a region, organize the counties in several ways and create interesting displays.

To Discuss

How many kernels of unpopped popcorn are in one level measuring cup? How much popped corn does this one cup equal? (First estimate your answers, then experiment.) How many cups do you need to count to talk about the typical (average) numbers?

Research Triangle Hop



Directions: Each player needs a gameboard and a set of number tiles, numbered 0-9. Twelve cards numbered 9 through 20 should be shuffled and placed face down on the table. Turn over the top card. Each player uses his/her tiles and tries to make each side of the triangle equal the number on the card. The first player to finish wins 3 points. The player with the highest total of points after 5 rounds wins the game.

Week 9

Facts of the Week

3 × 6 = 18 18 ÷ 3 = 6

9 + 7 = 16 16 − 9 = 7

Write A Story

Calculator Exploration

Would you rather have 37 quarters or 186 nickels? Would you prefer $450 a week allowance or $20,000 a year?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Add: 30 + 40 + 100
2. 12 ÷ 2 + 4 × 2
3. Estimate the number of days in 2 months
4. 100 − 4
5. 3 × 7
6. The value of a quarter, 3 dimes, and a nickel
7. Number of centimeters in a decimeter
8. 1/2 of 28

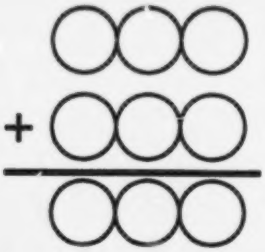
Game of the Week

Tweetsie 25

This is a game that appeals to flexible thinkers. Each set of numbers has at least one solution. You will need to model the activity before students play the game. You might use 6, 7, 6, 4.

Problem For the Week

Use the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9 one time each to fill in these circles to make a true equation. One solution is 237 + 654 = 891. There are over 300 solutions with 32 different sums.



Data Exploration

Do people in N.C. move about more today than they did a generation ago?

To begin this investigation record the information from these two questions: *Are you growing up in the same area (town) as your mother did? Did your mother grow up in the same area as her mother did?*

Use the data (yes and no responses) to create a double bar graph.

To Discuss

Which list is longer, the North Carolina occupations that use no mathematics skills or the North Carolina occupations which use mathematics every day?

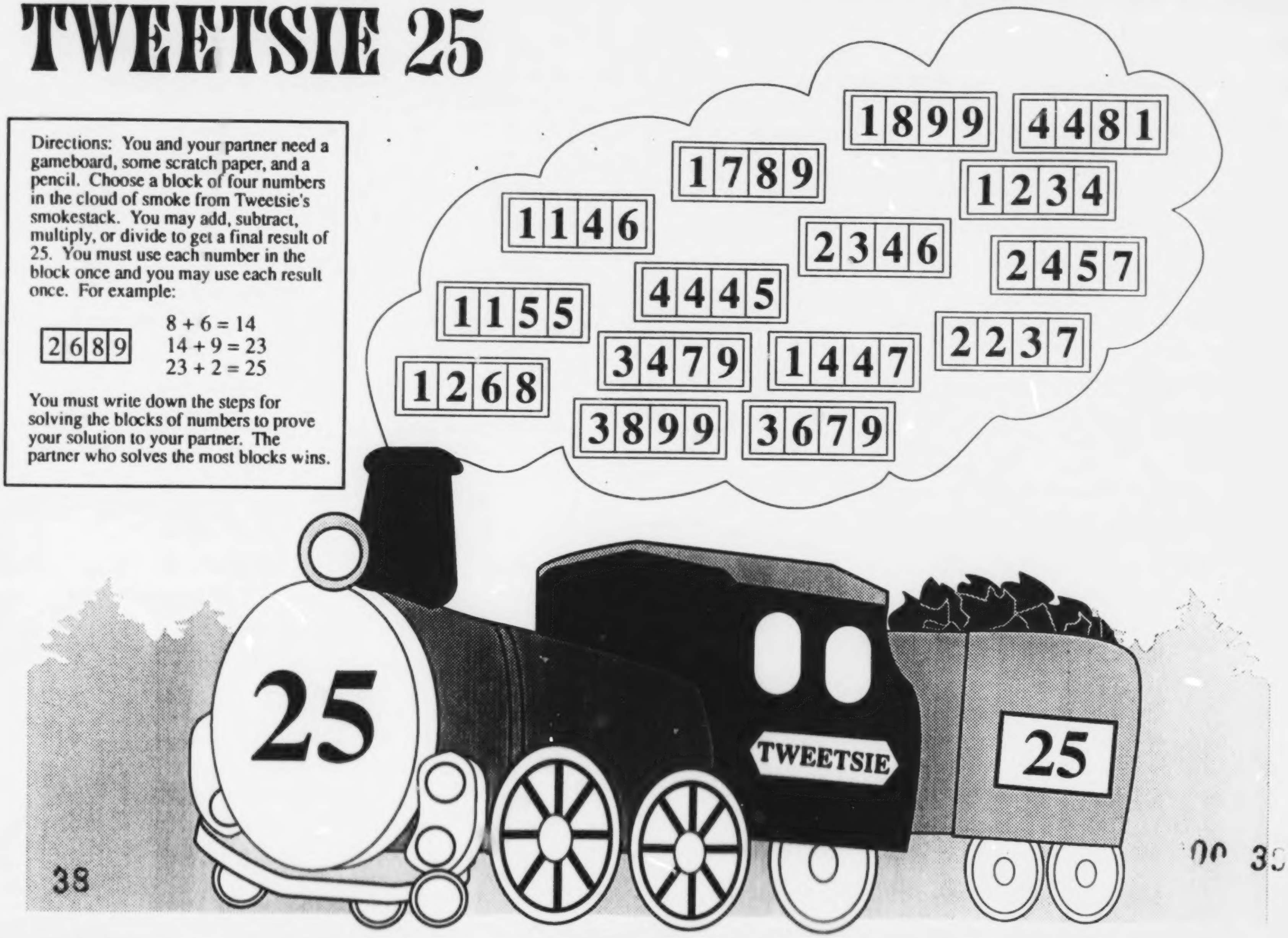
TWEETSIE 25

Directions: You and your partner need a gameboard, some scratch paper, and a pencil. Choose a block of four numbers in the cloud of smoke from Tweetsie's smokestack. You may add, subtract, multiply, or divide to get a final result of 25. You must use each number in the block once and you may use each result once. For example:

2	6	8	9

8 + 6 = 14
14 + 9 = 23
23 + 2 = 25

You must write down the steps for solving the blocks of numbers to prove your solution to your partner. The partner who solves the most blocks wins.


1899
4481
1789
1234
1146
2346
2457
1155
4445
2237
3479
1447
1268
3899
3679
25
TWEETSIE
25

Week 10

Facts of the Week

4 × 3 = 12
9 + 8 = 17
12 + 4 = 3
17 − 9 = 8

Write A Story

Calculator Exploration

How many fourth graders would it take to make a human chain around the world at the equator? The distance around the world at the equator is 40,000,000 meters.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. In 4235, what digit is in the ten's place?
2. 18 + 2 + 4 − 5
3. How many dozens of donuts are needed so everyone in our class gets one donut
4. 80 − 7
5. 11 × 8
6. If a hamburger costs 85¢, how much change would you get from $1?
7. Which is shorter—1 foot or 1 meter?
8. Which is greater—1/3 or 1/2?

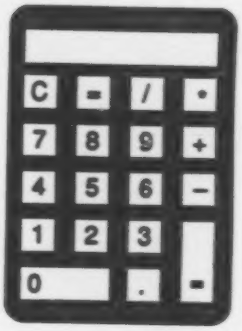
Game of the Week

Asheville Nature Center

This is another opportunity to practice multiplication. The game can be changed by making a new gameboard and assigning another number.

Problem For the Week

How old are you in years, in days, in hours, in minutes, and in seconds?



Data Exploration

Divide the class into groups and have each group choose 5 North Carolina cities and find their altitudes. Write 10 word problems that can be solved using this information or data from previous investigations.

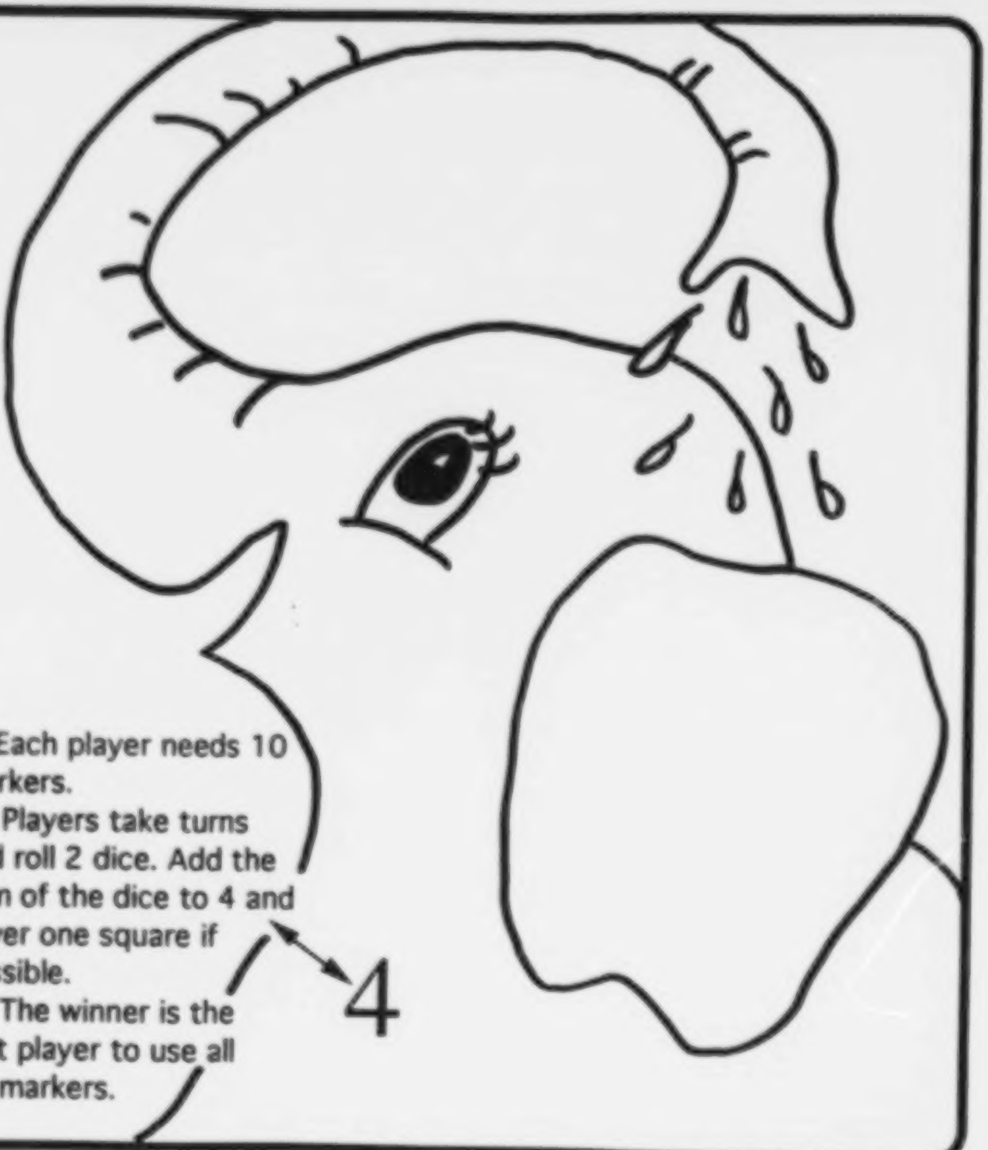
To Discuss

Have you picked a partner-city in North Carolina? What criteria are you going to use to pick your city? What things could you compare?

Do newspapers affect people's opinions?

SPLASH

13	10	8	11
12	6	14	9
9	10	12	11
11	9	7	15
8	10	13	10
7	12	11	9
13	9	14	16
10	8	12	7



1. Each player needs 10 markers.
2. Players take turns and roll 2 dice. Add the sum of the dice to 4 and cover one square if possible.
3. The winner is the first player to use all 10 markers.

Week 11

Facts of the Week

8 × 7 = 56

56 ÷ 8 = 7

9 + 9 = 18

18 − 9 = 9

Write A Story

Calculator Exploration

How many different whole numbers will divide 168 without a remainder? How many different whole numbers will divide 155 without a remainder?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 1 more than 999
2. 7 × 4 − 4 + 2
3. Round to nearest ten: 26
4. 28 + 60
5. 10 × 5
6. 15 minutes after 7:25
7. Number of cups in 16 ounces
8. Number of days in a year

Game of the Week

Flying High

This activity gives students more practice in mental computation. Students practice "adding on" while trying to reach a target number.

Problem For the Week

If these two cubes were cut apart along the dotted lines, make a list for each figure to show how many faces on the smaller cubes would be painted on all faces? on no faces? one face? two faces? three faces? four faces? five faces?

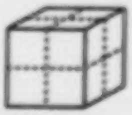


figure 1

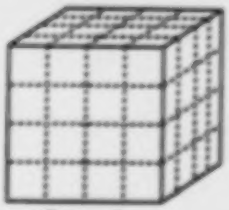


figure 2

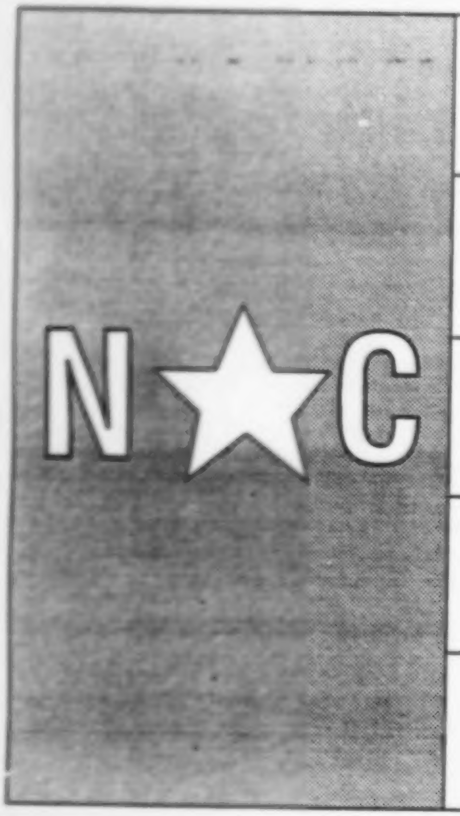
Data Exploration

Brainstorm natural resources of North Carolina. Make a chart catagorizing them as renewable and non-renewable. Is it possible to determine how rapidly they are being used? Organize them in some way and display the information.

To Discuss

If you traveled from North Carolina to California in a straight line, approximately how many states would you travel through? Name those states.

Flying High



6	6	6	6	6
5	5	5	5	5
4	4	4	4	4
3	3	3	3	3
2	2	2	2	2

Materials: Gameboard & markers

Directions: Each player needs 10 markers. Players decide on target number between 30 and 76 and write on sheet of paper. Players take turns placing a marker on one of the numbers on the board, each time announcing the cummulative sum of the covered numbers. Each number may be covered only once. Example: Player one covers 3, the second player covers 5 and announces 3 + 5 = 8. The third player may cover 4 and announce 8 + 4 = 12. The first player to reach the target number exactly wins. If a player goes over the target number, he or she is out.

Week 12

Facts of the Week

3 × 7 = 21

21 + 3 = 7

6 + 7 =13

13 − 6 = 7

Write A Story

Calculator Exploration

The division key on your calculator does not work. How would you work this problem on the calculator without the division key? 216 divided by 54.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 10 more than 550
2. 12 + 13 + 5 + 11
3. Round to nearest ten: 92
4. 40 − 4
5. 7 × 2
6. 16 minutes before 8:00
7. The value of 3 quarters, 2 dimes, and 3 pennies
8. Number of legs on 6 tables

Game of the Week

Asheboro Zoo: Munch!

This is a strategy game in which students use four digits to write equations which result in a target number.

Problem For the Week

There are 4 possible scoring plays in an NFL football game: Touchdown = 6 points; Point after touchdown = 1 point; Field goal = 3 points; and Safety = 2 points.

a. How many different ways could the team score 11 points?

b. What final scores, between 1 and 30, are not possible for a team to make?

Data Exploration

Do you think the school year should be lengthened to 200 days?

Survey students in the fourth grade, using answer choices of yes, no, and undecided. Do you think the results of the survey would be different if you talked to first graders? Adults? Discuss your original question and the results of the surveys.

To Discuss

How many different ways could you arrange the desks in your classroom so that everyone could see the board?

How could you show the arrangements?

MUNCH!

1. Each player needs 8 markers. The object of the game is to be the first player to capture 8 numbers on the gameboard.
2. To begin each round, choose a target number from the gameboard.
3. Each player rolls 4 dice. Players may add, subtract, multiply or divide.
4. The player who comes closest to the target number for that round without going over captures that space.
5. In case of ties, both players may put markers on the target number.

50

60

75

40

65

70

30

10

100

20

80

40

25

35

55

20

10

90

Week 13

Facts of the Week

$4 \times 7 = 28$ $28 \div 4 = 7$
$7 + 8 = 15$ $15 - 7 = 8$

Write A Story

Calculator Exploration

How many years would it take you to spend $1,000,000 if you spend $25 a day?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. The largest two-digit number
2. $4 \times 4 + 10 - 1 \div 5$
3. Round to nearest ten: 41
4. $15 + 14$
5. 9×6
6. The value of 8 dimes, 2 nickels, and 10 pennies
7. Number of feet in 2 yards
8. 1/2 of $10

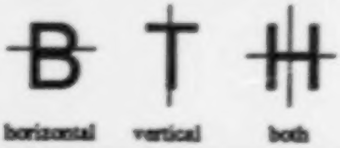
Game of the Week

Charlotte Speedway Race

Multiplication with 2 and 5 as factors is the focus of this game. Each pair of students will need one special die numbered 1,1,2,2,3,3.

Problem For the Week

Classify letters (capitals) of the alphabet according to those with horizontal symmetry, vertical symmetry, and both horizontal and vertical symmetry. How many words can you find in which all the letters in the word have only horizontal line symmetry or only vertical symmetry?



Data Exploration

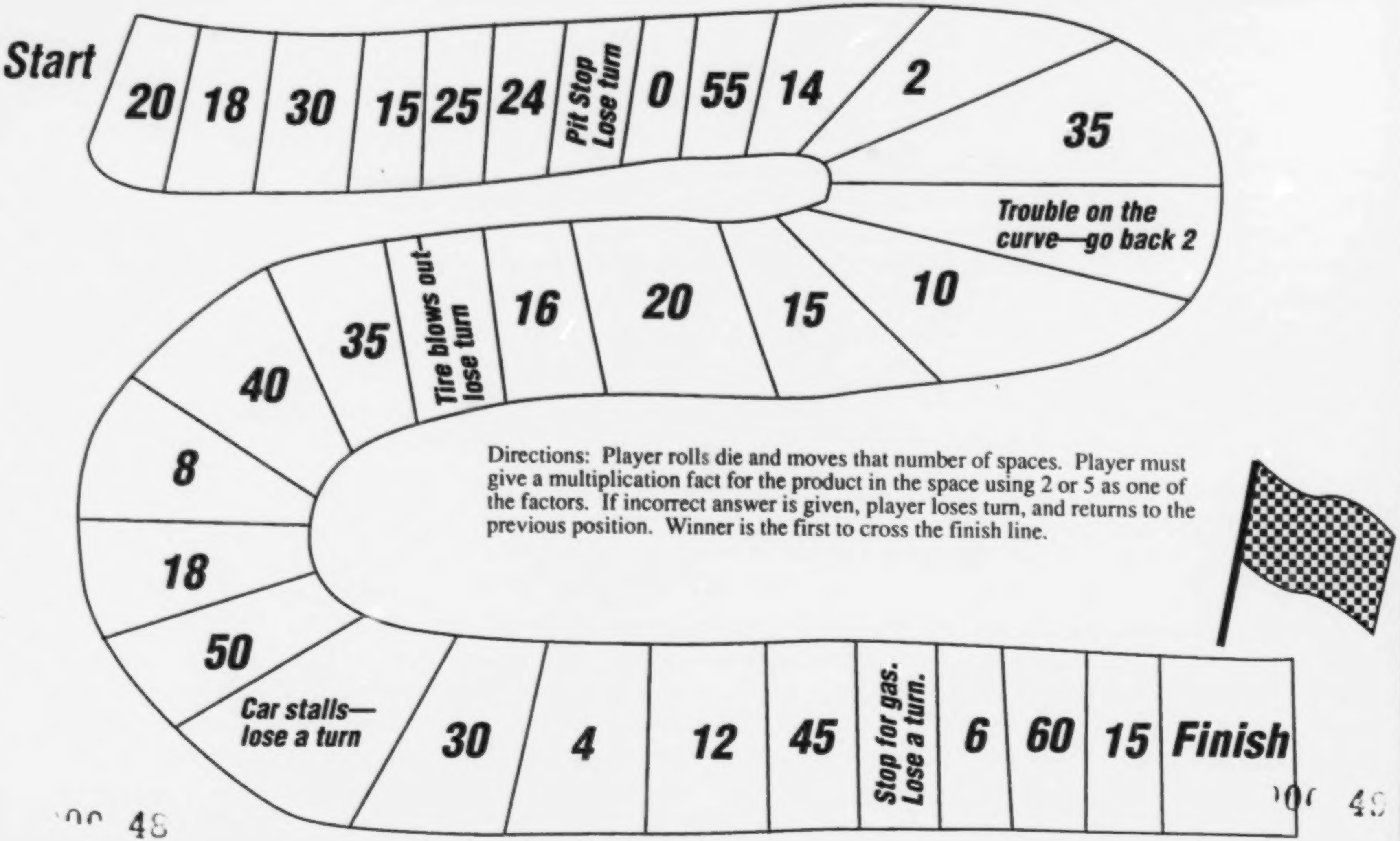
Find the average annual rainfall in your region for each of the four seasons. Graph the information using a variety of graphs. Discuss generalizations that might be drawn from this information. Are these valid generalizations? Why or why not?

To Discuss

Think of at least one math word that starts with each letter of the alphabet. Can you think of more than one word per letter?

2 Players
Materials: Gameboard, a marker for each player, one die numbered 1, 1, 2, 2, 3, 3

Charlotte Speedway Race


Start
20
18
30
15
25
24
Pit Stop
Lose turn
0
55
14
2
35
Trouble on the curve—go back 2
10
15
20
16
Tire blows out—lose turn
35
40
8
18
50
Car stalls—lose a turn
30
4
12
45
Stop for gas.
Lose a turn.
6
60
15
Finish

Directions: Player rolls die and moves that number of spaces. Player must give a multiplication fact for the product in the space using 2 or 5 as one of the factors. If incorrect answer is given, player loses turn, and returns to the previous position. Winner is the first to cross the finish line.

Week 14

Facts of the Week

3 × 11 = 33
33 ÷ 3= 11
6 + 9 = 15
15 – 6 = 9

Write A Story

Calculator Exploration

Americans eat about 400,000 bushels of bananas a year. If there are 125 bananas in a bushel, how many bananas would that be? How many banana splits could you make?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write eighty thousand five hundred.
2. 17 + 2 – 14 × 6 + 2
3. Round to nearest ten: 98
4. 72 + 30
5. 10 × 9
6. 15 minutes before 3:10
7. Number of centimeters in one meter
8. Which is smaller—1/4 or 1/8?

Game of the Week

Brown Mountain Lights I-IV

To play these games each player will need about 25 small markers of the same color. You might have students cut squares from construction paper or use popcorn and small beans as markers. There are 4 versions of the same game, each focusing on different factors.

Problem For the Week

Use the capital letters from last week's activity and find the value of North Carolina using the following rules: Letters without a line of symmetry are worth a penny, letters with horizontal symmetry are worth a nickel; letters with vertical symmetry are worth a dime; and letters that have both horizontal and vertical symmetry are worth a quarter. Whose name in the class is most valuable?

Data Exploration

What is the average cost of toys which fourth graders like best? What questions do you need to ask to get this information? Are the median and mode prices similar? Discuss what "average cost" means.

Note to teachers: If you decide to talk about arithmetic means, let the students use a calculator to determine the average.

To Discuss

Tracy, Bobby,Tery, and Jo played in a computer games tournament in pairs. The girls swapped partners for the second game. Who played with whom in each game?

1. Bobby and his teammate won the first game.
2. Tery and her teammate lost the second game.
3. Tracy was on a winning team in just one of his two games.

BROWN MOUNTAIN LIGHTS I

7 x 4	8 x 3	6 x 4	3 x 4	7 x 3	4 x 8	5 x 3
8 x 4	3 x 9	5 x 3	3 x 8	4 x 12	9 x 4	3 x 6
2 x 3	1 x 4	11 x 3	4 x 3	4 x 0	3 x 3	2 x 4
10 x 3	8 x 3	4 x 5	3 x 2	4 x 6	3 x 5	4 x 10
0 x 4	7 x 4	3 x 12	4 x 8	11 x 4	4 x 7	1 x 3
4 x 2	10 x 4	3 x 3	7 x 3	3 x 11	9 x 3	6 x 4
3 x 7	4 x 9	6 x 3	4 x 1	5 x 4	3 x 0	4 x 11
12 x 3	0 x 3	3 x 10	12 x 4	3 x 1	4 x 4	3 x 4
5 x 4	6 x 4	3 x 5	7 x 3	8 x 4	4 x 7	4 x 8

Directions: You and your partner need 25 different colored markers and a gameboard. The first player chooses any block on the board and gives the product of the two factors. If correct, the player keeps the marker on the factors. If incorrect, that turn is lost. The winner is the first player to make 5 blocks in a row, column, or diagonal.

BROWN MOUNTAIN LIGHTS II

5 x 1	11 x 5	6 x 3	7 x 5	5 x 9	3 x 5	10 x 5
4 x 5	5 x 8	6 x 7	5 x 6	2 x 6	6 x 8	11 x 6
9 x 5	6 x 2	5 x 2	4 x 6	5 x 5	6 x 10	5 x 7
7 x 6	6 x 12	10 x 6	6 x 1	12 x 5	6 x 6	5 x 5
5 x 12	5 x 3	5 x 10	8 x 6	6 x 6	6 x 4	6 x 5
3 x 6	1 x 6	6 x 9	5 x 4	6 x 5	12 x 6	7 x 6
2 x 5	5 x 6	8 x 5	6 x 11	1 x 5	5 x 11	9 x 6
6 x 5	8 x 5	9 x 6	6 x 7	5 x 4	8 x 5	6 x 6
4 x 6	7 x 6	5 x 5	3 x 6	5 x 6	6 x 8	7 x 6

Directions: You and your partner need 25 different colored markers and a gameboard. The first player chooses any block on the board and gives the product of the two factors. If correct, the player keeps the marker on the factors. If incorrect, that turn is lost. The winner is the first player to make 5 blocks in a row, column, or diagonal.

BROWN MOUNTAIN LIGHTS III

7 x 1	8 x 6	7 x 8	12 x 7	8 x 9	3 x 7	7 x 12
8 x 10	9 x 7	8 x 9	8 x 5	7 x 5	8 x 4	3 x 8
8 x 7	8 x 11	8 x 1	2 x 8	2 x 7	8 x 10	7 x 7
8 x 12	7 x 2	8 x 8	7 x 4	6 x 8	7 x 11	8 x 8
8 x 7	8 x 8	7 x 7	1 x 7	5 x 7	5 x 8	4 x 7
1 x 8	8 x 2	8 x 12	7 x 10	11 x 7	7 x 6	8 x 11
10 x 7	7 x 9	7 x 3	6 x 7	8 x 3	4 x 8	7 x 8
6 x 8	8 x 7	8 x 9	8 x 8	9 x 7	7 x 3	7 x 9
5 x 7	3 x 8	7 x 7	6 x 8	8 x 3	9 x 8	4 x 8

Directions: You and your partner need 25 different colored markers and a gameboard. The first player chooses any block on the board and gives the product of the two factors. If correct, the player keeps the marker on the factors. If incorrect, that turn is lost. The winner is the first player to make 5 blocks in a row, column, or diagonal.

BROWN MOUNTAIN LIGHTS IV

8 x 10	6 x 9	9 x 7	7 x 9	11 x 9	10 x 2	9 x 9
10 x 8	10 x 3	10 x 7	10 x 1	3 x 10	9 x 3	5 x 10
9 x 12	9 x 1	2 x 10	6 x 10	9 x 8	10 x 8	12 x 9
5 x 9	7 x 10	9 x 11	10 x 10	10 x 6	10 x 9	10 x 12
1 x 10	4 x 9	11 x 10	9 x 2	2 x 9	4 x 10	1 x 9
12 x 10	10 x 4	9 x 5	8 x 9	10 x 11	9 x 4	10 x 10
9 x 6	9 x 10	3 x 9	10 x 5	9 x 9	10 x 10	9 x 10
7 x 9	5 x 9	9 x 4	9 x 7	9 x 4	9 x 5	2 x 9
3 x 9	9 x 9	9 x 6	8 x 9	6 x 9	4 x 9	8 x 9

Directions: You and your partner need 25 different colored markers and a gameboard. The first player chooses any block on the board and gives the product of the two factors. If correct, the player keeps the marker on the factors. If incorrect, that turn is lost. The winner is the first player to make 5 blocks in a row, column, or diagonal.

FAMILY FUN FACTS NIGHT

A SPECIAL EVENING OF MATH GAMES TO PRACTICE NUMBER FACTS

FAMILY FUN FACT NIGHTS are designed to bring parents and fourth grade students together at school to participate in a fun evening of drill and practice. It is an opportunity to give parents information about the school's expectations for memorization of number facts and it allows parents, teachers and students to get together in a positive setting. With the investment of a few dollars in paper you will be able to send home copies of the games for parents and students to play again.

Guidelines for the evening are simple. The media center or cafeteria is set up with an activity on every table. Parents and children are partners. After playing a game, they may remove a copy of the gameboard from the envelope on the table. The gameboard copies go home; but dice, cards, and markers stay on the table for the next players. The time schedule is rigidly adhered to - everything is over in one hour.

Components of Family Fun Facts Night include:

- number facts games (use the games in these materials plus others you may have) and any markers, cards, or dice needed to play the games
- a station with materials to make flash cards (have samples of the harder facts only)
- refreshments (parent volunteers)
- posters around the room for data collection (for example, graph birthday months, number of people who came in each vehicle, preferences in food or drink or tv show, etc.)

Multiple copies of the same gameboards with directions should be placed in large envelopes or file folders. Dice, cards, markers, etc. for two groups of players should go on the table with the gameboards. You will want at least 20 extra copies of each gameboard. If possible, run different games off on different colored paper. If you do not have enough games for there to be a different one on each table, repeat those that your students seem to like best.

You may wish to make a display of commercial games in which students practice math skills; these usually take too long to play in this one-hour setting. You might display "Twenty Four" or "Yatzee", for example. Be sure to take pictures and display them for the entire school to see!

During the opening remarks or in a pamphlet you may wish to let parents know what your school's expectations are for the memorization of number facts. Because knowledge of facts and place value understandings are important components of "number sense", an appropriate goal is that students will know all of the addition, subtraction, multiplication, and division facts by the end of the fourth grade. Encourage parents to work with their children on strategies for remembering (and figuring out) facts. They may wish to have timed number facts drills (either oral or written) and then help students chart the number correct in the short drills. The goal is to improve speed and accuracy and to compete with one's own record. You will need to remind parents that **learning number facts is a long-term goal** and that these facts should be reviewed throughout the fourth grade. You will also want to stress that several short periods of work, held frequently, are better than long, grueling sessions. Make learning fun!

Week 15

Facts of the Week

$7 \times 11 = 77$ $77 \div 7 = 11$
$8 + 6 = 14$ $14 - 6 = 8$

Write A Story

Calculator Exploration

What 3 consecutive even numbers have a sum of 204?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 50 more than 650
2. $14 + 20 - 6 + 4$
3. Round to nearest hundred: 241
4. $80 - 11$
5. 4×0
6. The value of 6 nickels and 2 quarters
7. Number of feet in 24 inches
8. Number of legs on 3 spiders

Game of the Week

Carolina Clip-It

Two paper clips, a gameboard, and markers for each player are the supplies for this game. Students use both game-playing strategies and knowledge of multiplication facts to try to win.

Problem For the Week

How large is the area of your hand? Which is larger (and about how much), the area of your hand or the area of your foot?

How does the size of your hand and your foot compare with your teacher's hand and foot?

Have you read *Dad's Diet* by Barbara Comber? Measurement and other mathematical possibilities abound!

Data Exploration

Use the daily newspaper and record on a chart the time of sunrise and sunset for one week. Display the information on a graph of your choice. Is there a pattern to the times of sunrise and sunset over this period?

To Discuss

How many ways does a farmer in North Carolina use math to plant a crop in his field?

How many ways does a merchant use math in his store?

How many ways do you use math?

Carolina Clip-It

2 players
Materials: Gameboard, 2 paper clips, different colored markers

1	7	15	25	36	54
2	8	16	27	40	56
3	9	18	28	42	63
4	10	20	30	45	64
5	12	21	32	48	72
6	14	24	35	49	81

1 2 3 4 5 6 7 8 9

Directions: Player one places paper clips on two numbers at the bottom of the page. Player one multiplies the two numbers and places a marker on the correct product. Player two can move only one paper clip, multiply the two numbers, and place a marker on the correct product. Both paper clips may be placed on the same number. Play continues until one player has 4 in a row or diagonally.

Week 16

Facts of the Week

8 × 11 = 88
88 ÷ 8 = 11
8 + 8 = 16
16 – 8 = 8

Write A Story

Calculator Exploration

The keys 7 and 8 are broken and do not work on your calculator. How would you do this problem on the calculator without using those keys?

$$\begin{array}{r} 275 \\ \underline{+\ 823} \end{array}$$

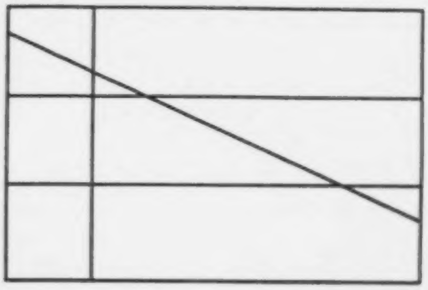
Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. In 5043, what digit is in the hundred's place?
2. 7 + 19 – 3 + 1 + 8
3. Round to nearest hundred: 862
4. 90 + 14
5. 7 × 6
6. 12 minutes after 4:30
7. Number of yards in 12 feet.
8. Mary had 75¢. She bought a pen for 25¢ and a sticker for 10¢. How much did she have left?

Problem For the Week

How many quadrilaterals are in this design?



Data Exploration

Brainstorm a list of things which you could observe that are likely to change over time. For example, the number of minutes your older sister talks on the phone each day or the number of cars that pass your house each day between 5 and 5:30 p.m. Choose one topic to investigate and keep data for two weeks. Display your data and write a summary of what you observed.

Game of the Week

Fort Macon Maze

This game reviews multiplication with 8 as a factor. Each player needs a marker (about the size of a centimeter cube). Use paper squares if small gameboard markers are not available.

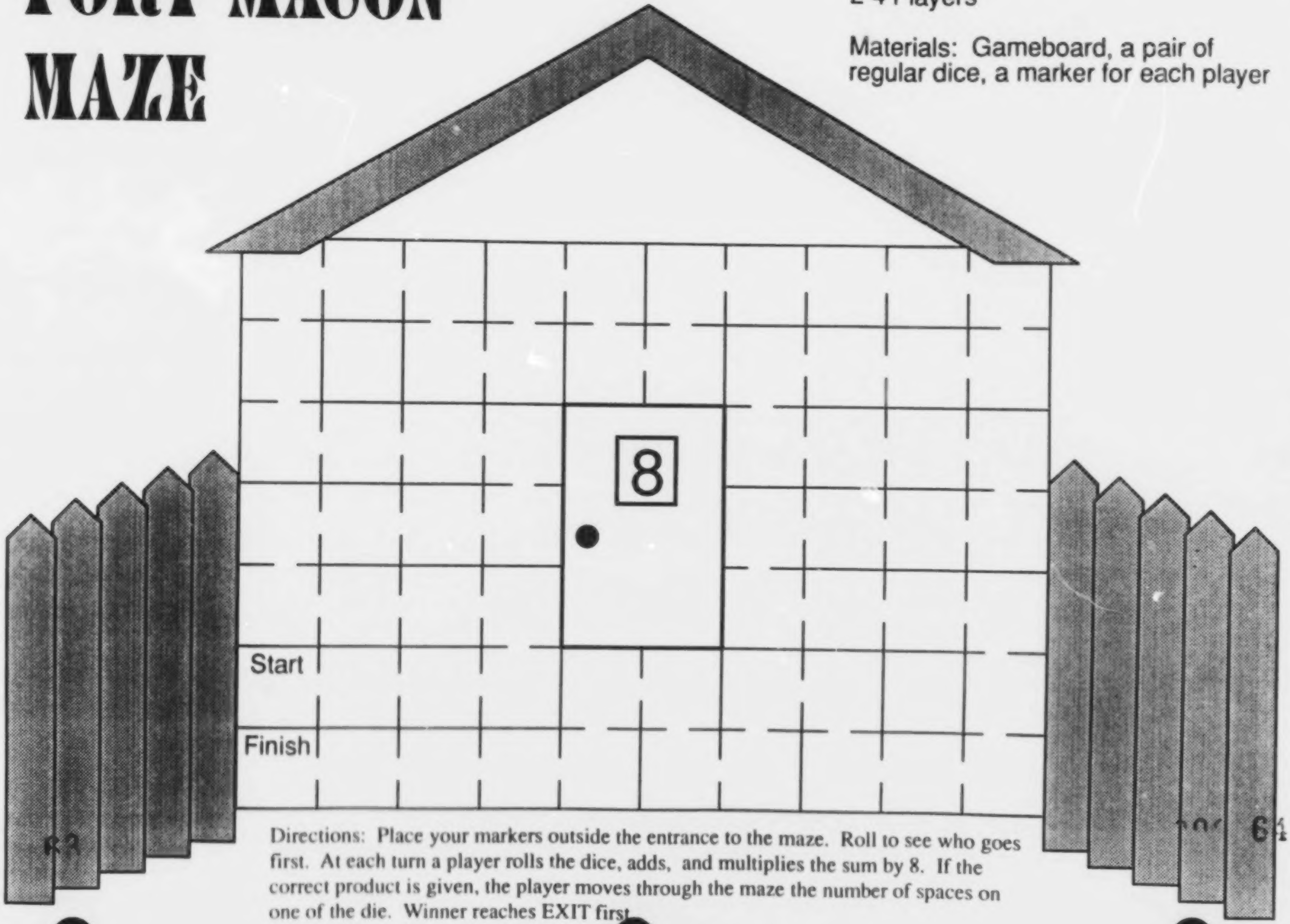
To Discuss

It takes one tree to make a stack of newspapers three feet high. About how many days' worth of your local newspapers is this? If each student in a public elementary school in North Carolina recycled one stack, how many trees could be saved?

FORT MACON MAZE

2-4 Players

Materials: Gameboard, a pair of regular dice, a marker for each player



Directions: Place your markers outside the entrance to the maze. Roll to see who goes first. At each turn a player rolls the dice, adds, and multiplies the sum by 8. If the correct product is given, the player moves through the maze the number of spaces on one of the die. Winner reaches EXIT first.

Week 17

Facts of the Week

3 × 12 = 36 36 + 3 = 12
7 × 12 = 84 84 + 7 = 12

Write A Story

Calculator Exploration

Find two numbers whose product would be between 430 and 450.
Find two numbers whose product would be between 2,500 and 2,600.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write one thousand forty two
2. 2 + 13 + 5 + 1
3. Round to nearest ten cents: 57¢.
4. 60 – 9
5. 8 × 11
6. The value of 5 dimes, 1 quarter, and 2 nickels
7. Number of ounces in 5 cups
8. Number of sides on 4 stop signs

Game of the Week

Asheboro Zoo - Division Duel

You will be able to adjust the difficulty by using easier or more difficult flash cards, according to which facts the students need to memorize.

Problem For the Week

Listen to the song "The Twelve Days of Christmas." How many gifts in all did my true love give to me?

First day: My true love gave to me a partridge in a pear tree.

Second day: My true love gave to me two turtle doves and a partridge in a pear tree.

1 + 1 + 2

Data Exploration

Which grocery store has the "best-buys"? Collect grocery ads from different stores or visit them in person. Select several common items and compare prices. Chart your information. Survey your parents: *In what grocery store do you shop most frequently? Why do you shop there?*

To Discuss

What place has the highest elevation in North Carolina? What place has the lowest elevation in North Carolina? What is the difference between the highest and the lowest? What is the elevation of your town? Where did you find this information? How do contour maps show elevation?

Division Duel

PLACE
DIVISION
FLASH CARDS
HERE.
PUT THEM
FACE DOWN.

1	2	3	4	5	6	7
8	9	10	11	12	13	14

1	2	3	4	5	6	7
8	9	10	11	12	13	14

Each player draws one flash card from the top of the deck. Both players answer the division problems. The winner is the player whose answer is the larger number (the winner must be able to say his or her number fact correctly.) The winner of each round places a marker on his or her number grid. The champion is the first player to win 14 rounds.

Week 18

Facts of the Week

4 × 11 = 44 44 ÷ 4 = 11
8 × 12 = 96 96 ÷ 8 = 12

Write A Story

Calculator Exploration

Calculate these problems: 1 × 1 = **n**, 11 × 11 = **n**, 111 × 111 = **n**, 1111 × 1111 = **n**. Can you solve 11111 × 11111 = **n** without using the calculator? Check out your prediction.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 1 more than 2999
2. 14 + 30 + 4 + 6
3. Round to nearest hundred: 719
4. 59 + 31
5. 17 × 0
6. 10 minutes before 5:00
7. Which is longer—2 feet or 1 yard?
8. Number of ears on 9 mice

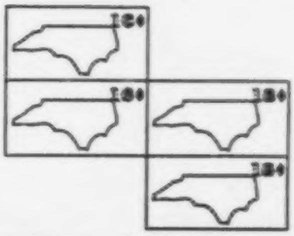
Game of the Week

Coast

This is a large group or whole class bingo game. Each student will need a gameboard. There are four games to each sheet. Students put products on their boards from your lighthouse transparency. There is a factor sheet to help keep track of the calls.

Problem For the Week

The post office has rectangular stamps for sale. How many different ways could the four stamps be arranged so that you buy them all attached? Here is one example.



Data Exploration

What are the favorite books of fourth graders?

Design a study to investigate this question. Are there ways to gather this information other than asking the students? Who might be interested in this information?

To Discuss

Do you think that students should be allowed to use calculators on tests? What arguments can you give for and against this issue?

How are calculators and computers (and other technology) used in jobs?

C	O	A	S	T
		FREE		

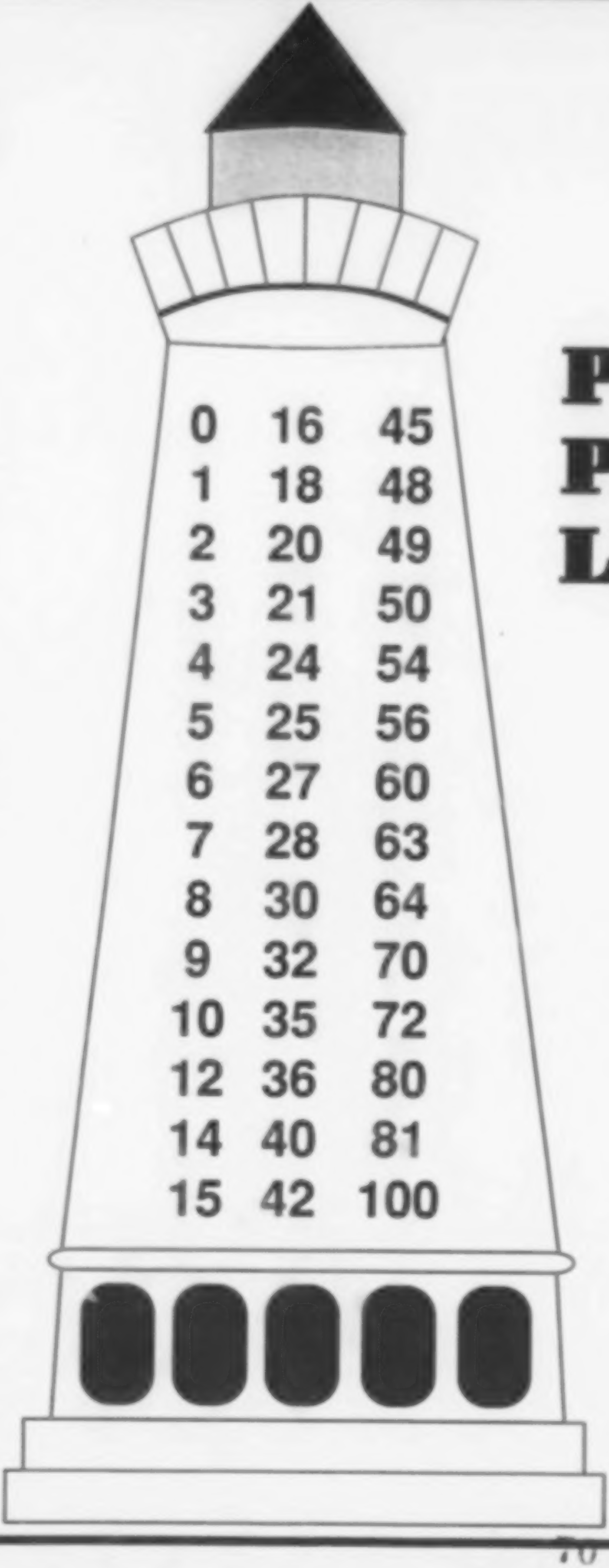
C	O	A	S	T
		FREE		

C	O	A	S	T
		FREE		

C	O	A	S	T
		FREE		

Directions: Choose numbers from the Possible Products Lighthouse and place them in the COAST grid. Select carefully the first time because ***erased numbers will not be counted***. Your teacher will call out two factors. You should cover the product of the factors if it is on your grid. Your teacher will tell how to win (5 in a row, four corners, letters of the alphabet, or cover the whole board).

Possible Products Lighthouse



0
1
2
3
4
5
6
7
8
9
10
12
14
15
16
18
20
21
24
25
27
28
30
32
35
36
40
42
45
48
49
50
54
56
60
63
64
70
72
80
81
100

Number facts for "Coast" Game

6 x 0
0 x 8
1 x 1
1 x 2
3 x 1
1 x 4
5 x 1
1 x 6
7 x 1
1 x 8
1 x 9
3 x 3
5 x 2
6 x 2
3 x 4
7 x 2
3 x 5

4 x 4
8 x 2
9 x 2
6 x 3
10 x 2
5 x 4
7 x 3
6 x 4
3 x 8
5 x 5
3 x 9
7 x 4
6 x 5
8 x 4
7 x 5
9 x 4
6 x 7

9 x 5
6 x 8
7 x 7
5 x 10
6 x 9
7 x 8
10 x 6
9 x 7
8 x 8
7 x 10
9 x 8
10 x 8
9 x 9
10 x 10
6 x 6
10 x 4

Note: These factors are in a similar order as the products appear on the Possible Products Lighthouse. They need to be called randomly when playing COAST.

Week 19

Facts of the Week

7 × 3 = 21
6 × 12 = 72
21 ÷ 7 = 3
72 ÷ 6 = 12

Write A Story

Calculator Exploration

What number times itself has a product of 144? What number times itself has a product of 1,024?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. In 98,000, what digit is in the thousands place?
2. 8 + 14 – 4 + 2
3. Round to nearest ten: 169
4. 42 – 11
5. 10 x 3
6. The value of 2 pennies, 3 nickels, and 4 dimes
7. Number of inches in 2 feet
8. Number of minutes in 1 hour

Game of the Week

Pamlico Pirates Reappear

This week revisits a familiar game with the added twist of using all four operations and a zero added to the gameboard.

Problem For the Week

Suppose all of the furniture were removed from your classroom. If 4th graders stand shoulder to shoulder in comfortably close rows, how many can stand together in your classroom? First make an estimate. Then figure out how you can investigate this. How many students would be able to stand on a football field?

Data Exploration

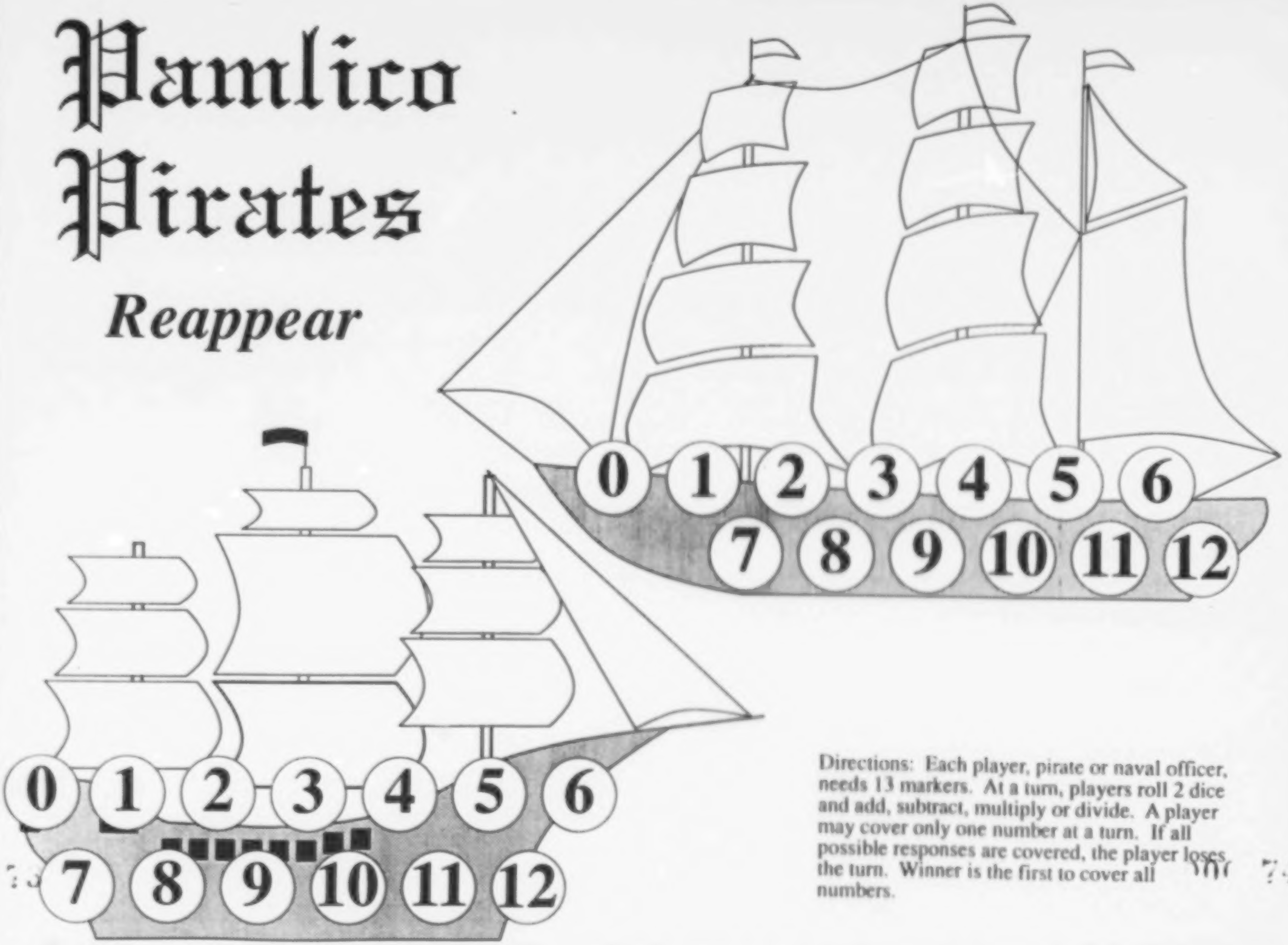
Collect data about your favorite North Carolina basketball team. Determine the median number of points scored by the players in any given game. Was there a mode in the points scored in that same game?

To Discuss

The Wright Brothers first flew in Kitty Hawk, North Carolina. Have each student interview 10 different people. Find out how many have been on an airplane. What fraction of the people interviewed have flown? What fraction have not flown?

Pamlico Pirates

Reappear


0
1
2
3
4
5
6
7
8
9
10
11
12
0
1
2
3
4
5
6
7
8
9
10
11
12

Directions: Each player, pirate or naval officer, needs 13 markers. At a turn, players roll 2 dice and add, subtract, multiply or divide. A player may cover only one number at a turn. If all possible responses are covered, the player loses the turn. Winner is the first to cover all numbers.

Week 20

Facts of the Week

6 × 11 = 66　　66 ÷ 6 = 11

4 × 12 = 48　　48 ÷ 4 = 12

Write A Story

Calculator Exploration

Which of the following numbers are evenly divisible by 2? Do they have anything in common?

72　85　34　7,958　666　57,890　641

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 10 less than 880
2. 12 + 14 + 6 + 4
3. Round to nearest hundred: 5,837
4. 56 ÷ 14
5. 8 x 7
6. 12 minutes after 1:15
7. Number of centimeters in 3 decimeters
8. Mary has $2.00 and spent 3 quarters. How much does she have left?

Game of the Week

Climbing Chimney Rock

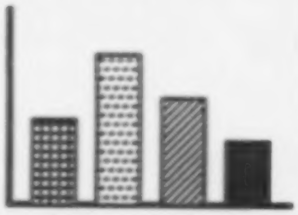
Take a break and revisit addition, 3 digits! Players race to choose addends to cover a specified sum. If a student is player 1 today, he or she can be player 2 later in the week.

Problem For the Week

On New Year's Day, January 1, Selma was asked her age. She replied, "The day before yesterday I was nine years old; next year I will be 12 years old." Explain how this could be true.

Data Exploration

The labels for this graph were accidentally erased from the computer. Brainstorm: *What could this graph represent? How would it be labeled? What could the title be? Is there more than one possible answer?*

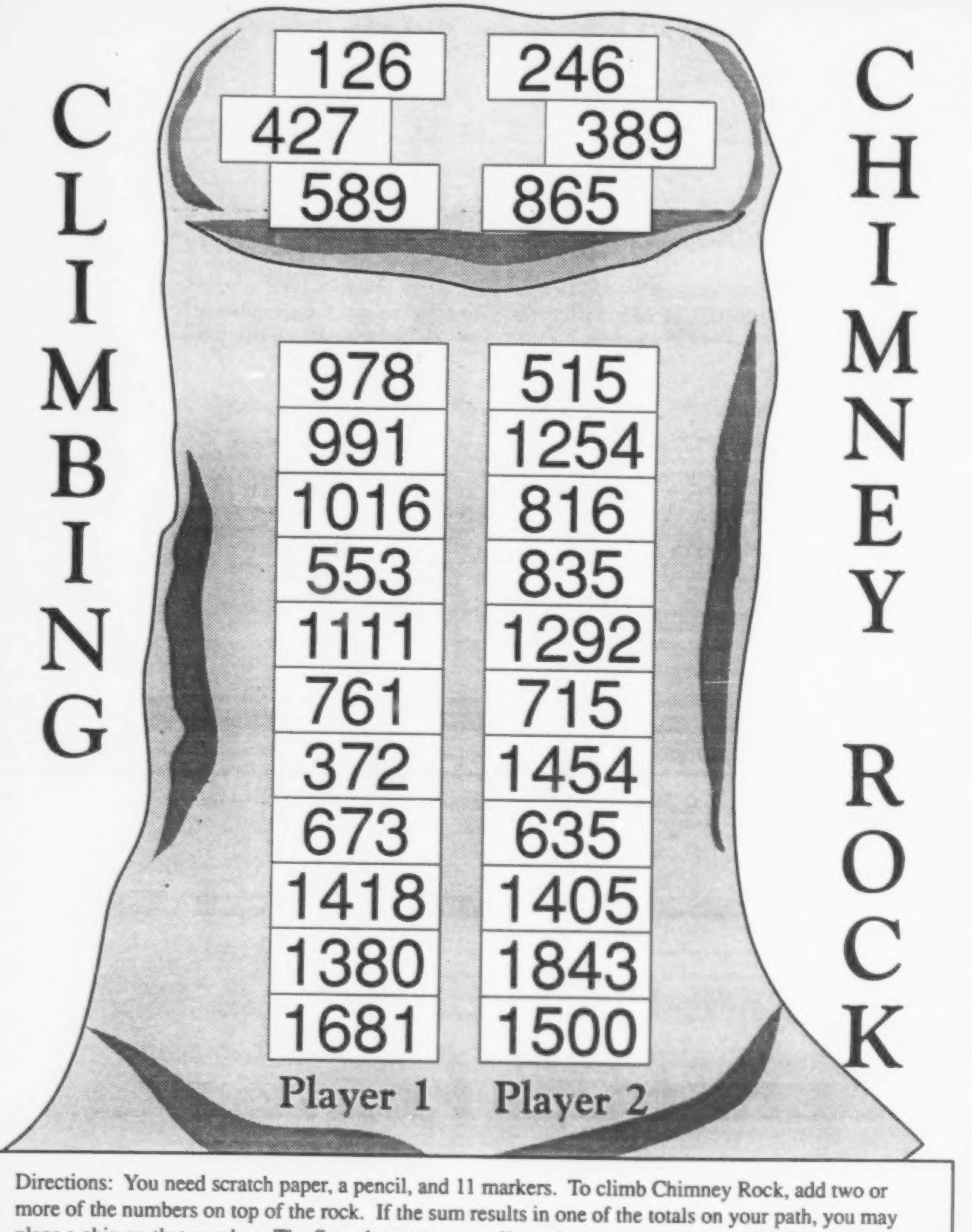


To Discuss

How is the population of our state determined? of your town? Why is it important to know our state's (and town's) population?

Research the history of censuses. What sort of information does a census record?

CLIMBING CHIMNEY ROCK



126 246
427 389
589 865

Player 1	Player 2
978	515
991	1254
1016	816
553	835
1111	1292
761	715
372	1454
673	635
1418	1405
1380	1843
1681	1500

Directions: You need scratch paper, a pencil, and 11 markers. To climb Chimney Rock, add two or more of the numbers on top of the rock. If the sum results in one of the totals on your path, you may place a chip on that number. The first player to cover all numbers on the path wins. (Or, the player who has the most numbers covered when time is up wins.)

Week 21

Facts of the Week

$11 \times 5 = 55$ $55 \div 11 = 5$
$12 \times 1 = 12$ $12 \div 12 = 1$

Write A Story

Calculator Exploration

I'm thinking of a number. I multiplied my number by 102, then subtracted 228. I then divided by 6. Finally I added 51. My result was 200. What number was I thinking of?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. The largest 3-digit number
2. 40 + 12 – 6 – 6 + 4
3. Round to nearest hundred: 2,510
4. 80 – 13
5. 49 x 1
6. The value of 3 dimes, 2 quarters, and 3 nickels
7. Number of ounces in a pound
8. Number of legs on 6 horses

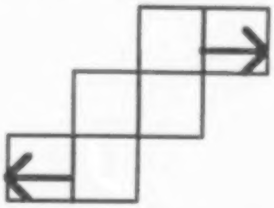
Game of the Week

Fire Tower Nim

Take a rest from number facts and do some visual problem solving. Notice that this game relates to equivalencies and is a good background activity for work with pattern blocks as fraction models.

Problem For the Week

If this hexomino were folded into a cube, which way would the arrows be pointing in relation to each other?



How many possible hexominos are there?

Data Exploration

Select a famous North Carolinian. Display on a time line five accomplishments or significant events in the life of this individual.

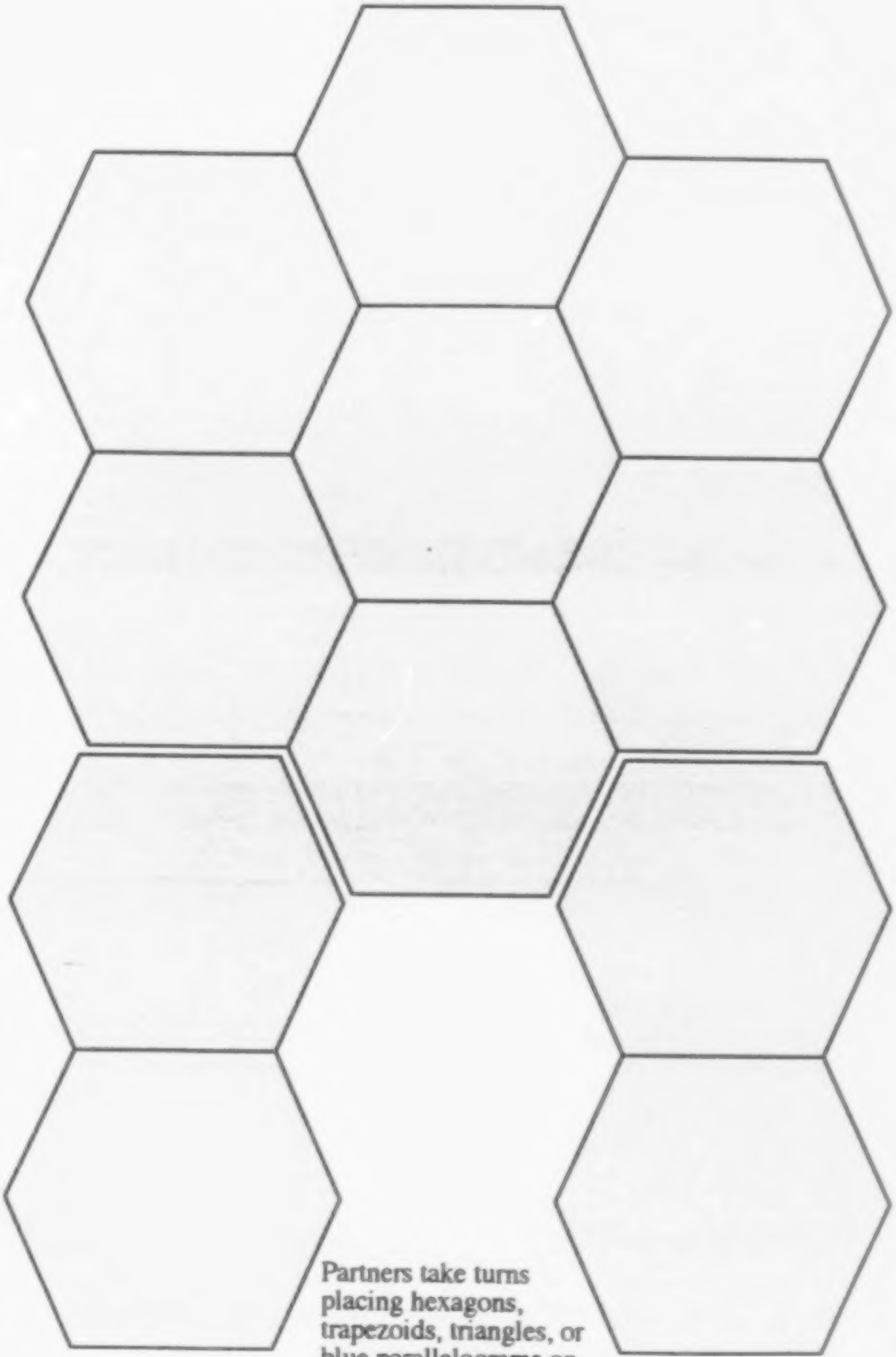
Develop a personal time line depicting significant activities and events in each student's life.

To Discuss

In the game of tic-tac-toe, what are the fewest moves that must be used to win the game? What are some strategies for winning?

Are there any strategies you might use for winning *Fire Tower Nim*?

Fire Tower Nim



Partners take turns placing hexagons, trapezoids, triangles, or blue parallelograms on the fire tower. The person who places the last block on the tower loses.

Week 22

Facts of the Week

11 × 7 = 77
12 × 3 = 36

77 ÷ 1 = 7
36 ÷ 12 = 3

Write A Story

Calculator Exploration

Arrange the digits 1 to 5 in the boxes. Arrange them so that the resulting product is the largest possible product.

□□□
× □□
Maximum

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write six thousand five
2. 12 + 2 + 2 + 4
3. Round to nearest thousand: 3,298
4. 26 + 23
5. 13 x 0
6. 25 minutes before 9:15
7. Number of weeks in 5 months
8. Number of seconds in 6 minutes

Game of the Week

Pounce I

Pounce is a game of speed and agility. At first the directions look complicated, but you will find that this game will be a favorite. To keep the pounce buttons and strings from tangling as they are stored, wrap the strings around a piece of an index card and store them in the pounce cup.

Problem For the Week

If vowels are worth 9¢, letters made with only line segments are worth 4¢ and letters with curved lines are worth 7¢, how much is NORTH CAROLINA worth? Find the following:

a. the county worth the most.
b. the county worth the least.
c. any counties worth the same as North Carolina.

Data Exploration

Divide the class into two groups. Compile lists of North Carolina state government jobs and local government jobs. Develop charts classifying them according to elected or non-elected positions.

To Discuss

What do you feel is the most useful number in our number system? List reasons to justify your answer.

What number systems were used by the Cherokee and other North Carolina Indian tribes?

12 28 36 20 3 5 24

25

49

16

Pounce I

Get Ready

1. Fix 4 Pounce Buttons on strings for each gameboard by attaching 18" strings to buttons.
2. Make 2 sets of Pounce flash cards per game.
3. Each group of 4 students needs a gameboard, flash cards, pounce buttons on strings, a marker to show the target number, a magarine tub for pouncing, and 10 counters of some kind for each player.
4. During a round, one person is the pouncer and other players hold a string.
5. The pouncer rotates after each round.

Place

Pounce

Buttons

Here

To Play

1. To begin put the marker beside one answer. At each round move the marker clockwise to determine the next target answer. Place flash cards in a stack face down.
2. Players put their pounce buttons in the oval on the gameboard, holding their strings. The pouncer does not have a button but has the pounce cup.
3. The pouncer turns over the flash cards one at a time so that all players may see the fact. If the answer is the target number, the pouncer tries to capture the buttons before they can be jerked away.
4. When the pouncer captures a button, that person must give the pouncer a counter. If the pouncer does not capture a person's button, the pouncer must give the player a counter.
5. Play continues until someone is out of buttons.

0

48

27

9 32 40 21 30 18

Pounce II Flash Cards

SEE WEEK 29

49 ÷ 7
28 ÷ 4
72 ÷ 9
40 ÷ 5
54 ÷ 9
24 ÷ 4
72 ÷ 8
36 ÷ 4
40 ÷ 8
20 ÷ 4
4 x 3
8 ÷ 8
7 – 6
6 x 3
12 – 3
12 – 7
14 – 7
13 – 6
12 – 6

42 ÷ 6
14 ÷ 2
64 ÷ 8
32 ÷ 4
48 ÷ 8
18 ÷ 3
63 ÷ 7
27 ÷ 3
35 ÷ 7
15 ÷ 3
2 x 6
6 ÷ 6
3 x 6
9 + 9
11 – 3
10 – 4
14 – 6
13 – 5
12 – 4

12 – 5
11 – 6
14 – 5
13 – 7
11 – 4
35 ÷ 5
56 ÷ 8
56 ÷ 7
24 ÷ 3
42 ÷ 7
12 ÷ 2
54 ÷ 6
18 ÷ 2
30 ÷ 6
3 x 4
8 + 4
7 ÷ 7
2 x 9
10 + 8

21 ÷ 3
63 ÷ 9
48 ÷ 6
16 ÷ 2
30 ÷ 5
81 ÷ 9
45 ÷ 5
45 ÷ 9
25 ÷ 5
6 x 2
9 + 3
9 – 8
9 x 2
6 + 3
11 – 5
14 – 8
14 – 9
13 – 8
5 + 7

Make flash cards from old file folders or construction paper. They should be about 3"x5" in size.

Pounce I Flash Cards

3 x 3	3 x 4	3 x 5	3 x 6	3 x 7	3 x 8	3 x 9
4 x 3	4 x 4	4 x 5	4 x 6	4 x 7	4 x 8	4 x 9
5 x 3	5 x 4	5 x 5	5 x 6	5 x 7	5 x 8	5 x 9
6 x 3	6 x 4	6 x 5	6 x 6	6 x 7	6 x 8	6 x 9
7 x 3	7 x 4	7 x 5	7 x 6	7 x 7	7 x 8	7 x 9
8 x 3	8 x 4	8 x 5	8 x 6	8 x 7	8 x 8	8 x 9
9 x 3	9 x 4	9 x 5	9 x 6	9 x 7	9 x 8	9 x 9
9 x 0	12 x 3	25 - 4	0 x 8	10 x 4	30 - 2	50 - 1
39 - 4	10 x 2	14 - 5	29 - 4	30 - 3	39 - 4	35 - 3

Make flash cards from old file folders or construction paper. They should be about 3"x5" in size.

Week 23

Facts of the Week

11 × 3 = 33
33 ÷ 11 = 3
12 × 6 = 72
72 ÷ 12 = 6

Write A Story

Calculator Exploration

If you had a million dollars and you decided to give away $50 every hour beginning on your 10th birthday, how old would you be when you ran out of money?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 1 less than 3000
2. 15 ÷ 3 + 2 + 1
3. Round to nearest dollar: $17.45
4. 42 – 12
5. 8 x 8
6. The value of 6 quarters, 2 dimes, and 8 pennies
7. Which is shorter — 7 centimeters or 7inches?
8. Number of wheels on 8 cars

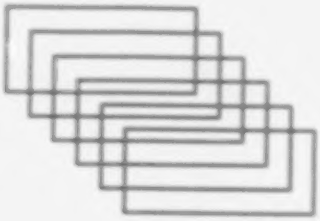
Game of the Week

Race to the Resort

This game can be played in groups of two, three or four. You may wish to use a sand timer if students "ponder" too long at a turn.

Problem For the Week

Six congruent rectangles were used to make this design. How many rectangles can you find?

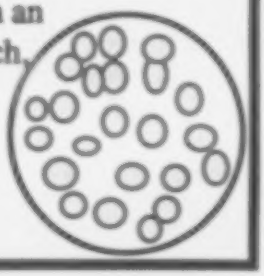


Data Exploration

Plan a Skittles investigation. About how many candies are in a bag? Are the colors evenly distributed? Divide the class into groups and use 2 or 3 large bags of Skittles. Give each group some to tally by color. Make bar graphs and line plots. To combine group information use pictographs as well as bar graphs with different scales.

To Discuss

What is the maximum number of pepperonis that will fit on an 8" pizza. (They may touch, but not overlap.) First, make an estimate and then test your guess.



Start

$6\overline{)42}$

$9\overline{)72}$

$64 \div 8$

OUT OF GAS LOSE A TURN

$4\overline{)28}$

$24 \div 8$

Race to the Resort

$5\overline{)35}$

$36 \div 9$

BONUS: MOVE AHEAD ONE!!

$9\overline{)81}$

$6\overline{)18}$

$16 \div 4$

FLAT TIRE: LOSE A TURN

$5\overline{)25}$

$24 \div 4$

SHIP AGROUND BACK 3 SPACES

$8\overline{)72}$

$3\overline{)15}$

$48 \div 8$

$6\overline{)42}$

SORRY, BACK TO STORMY SEAS

$4\overline{)32}$

$56 \div 8$

$4\overline{)36}$

$10\overline{)100}$

LOW ON FUEL LOSE A TURN

$20 \div 5$

$6\overline{)30}$

$54 \div 9$

NO WIND! BACK 3 SPACES

$64 \div 8$

$3\overline{)36}$

$48 \div 6$

$7\overline{)49}$

$49 \div 7$

You win!

Players take turns rolling a die. Move that many spaces if you can answer all of the facts along the way. If you land on the same square as your opponent, you can send that player back to start!

Week 24

Facts of the Week

11 × 8 = 88
12 × 2 = 24
88 ÷ 11 = 8
24 ÷ 12 = 2

Write A Story

Calculator Exploration

Player 1 enters a number and specifies a digit for the opponent to "wipe out". Player 2 may add or subtract. Ex., player 1 enters 542 and says to wipe out the 4. Player 2 succeeds by subtracting 40.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 40 less than 700
2. 6 + 7 + 40 - 3 ÷ 2
3. Round to nearest ten cents: $3.67
4. 80 ÷ 16
5. 11 x 5
6. 1 minute before 3:00
7. Number of feet in 6 yards
8. Double 35

Game of the Week

Blackbeard Strikes

This is another review with a chance to block your opponent. If the gameboard is too easy for some students, have them make a new grid with harder facts such as 7 x 8, 11 x 11, and 3 x 12.

Problem For the Week

A classical problem is determining how many squares are on a checkerboard. If you have not tried that problem, find the number of squares on a checkerboard. If you know how many squares are on a checkerboard, determine how many rectangles there would be on a checkerboard.

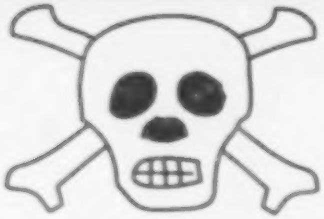
Data Exploration

Survey your parents to determine technological advances that we have today that your parents did not have at your age. Compile the information as a class. Create a method for displaying the results. Write a story about your parents' life as a child.

To Discuss

Is it possible to divide North Carolina into four congruent areas? Why or why not?

If you divided the state into four equal clusters of counties, would the land area be the same? The population?



Blackbeard Strikes!

5 x 9	3 x 8	4 x 5	3 x 8	5 x 8	2 x 4	3 x 7
6 x 4	5 x 4	5 x 8	4 x 4	5 x 3	4 x 7	5 x 7
2 x 9	5 x 5	6 x 3	4 x 6	2 x 2	6 x 7	2 x 7
6 x 8	2 x 3	3 x 4	5 x 2	3 x 5	5 x 6	4 x 8
5 x 4	4 x 9	6 x 6	4 x 3	6 x 7	3 x 5	5 x 9
3 x 8	3 x 9	6 x 5	6 x 9	6 x 8	2 x 5	6 x 4
4 x 2	6 x 7	4 x 7	2 x 6	3 x 9	4 x 8	3 x 6

Directions: The first player chooses any square on the board and gives the factors and the product. If the player is correct, he places a marker on that space. If the player is incorrect, he loses a turn. The second player takes a turn. The winner is the first player to cover 5 squares in a row, column, or diagonal. Players may not cover any square already covered.

Week 25

Facts of the Week

11 × 1 = 11
12 × 8 = 96

11 ÷ 11 = 1
96 ÷ 12 = 8

Write A Story

Calculator Exploration

Etha Lupton Wingate was born on September 16, 1892. When she celebrated her 100th birthday on September 16, 1992, how many months old was she? Days old? Hours old? Minutes old? Do you know any centurians?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Which is larger—4500 or 3999?
2. 2 + 25 ÷ 3 + 4
3. Round to nearest dollar: $11.15
4. 93 – 14
5. 6 x 6
6. The value of 17 dimes and 3 nickels
7. Number of inches in 4 feet
8. 1/2 of 48

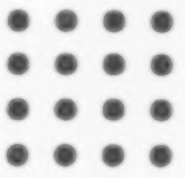
Game of the Week

South Square

Two games allow you to challenge students who know their multiplication facts. You may need to model how to keep score.

Problem For the Week

Connect all the dots to make an irregular polygon with the maximum possible number of sides. Is there more than one solution for this problem?



Data Exploration

Do most fourth graders get an allowance? Do the students who get an allowance have to do chores to earn it? What is the typical allowance of a fourth grader?

What are jobs fourth graders do to earn money?

To Discuss

Choose a town in South Carolina and one in Virginia. What is the shortest way to get from the South Carolina town to the Virginia town, traveling through North Carolina. Describe your route. How many miles did you travel? How would you go to these towns from your home?

SOUTH SQUARE

2-3 Players

Materials: 3 sets of cards numbered 4, 5, 6, 7, 8, 9 or die with faces numbered 4, 5, 6, 7, 8, 9; gameboard; 15 markers per player

12	14	15	16	18	20	21	8	24	27
28	30	32	35	36	40	42	44	45	48
25	12	16	18	20	24	27	28	32	36
49	50	77	54	55	56	60	63	64	65
48	60	24	18	16	32	40	18	16	80
30	42	60	64	80	36	54	72	40	48
66	96	70	72	75	80	81	84	88	90
60	84	90	56	99	63	48	72	36	80

Directions: First player draws card or rolls a die. The number that shows is the divisor. The player finds a number on the board divisible by this number and places a marker on it. The player scores the number of the quotient and one additional point for each adjacent square that has a marker on it. The square may be adjacent vertically, horizontally, or diagonally. A cumulative score is kept for each player. When all markers have been used, the scores are checked. High score wins.

Week 26

Facts of the Week

66 ÷ 11 = 6　6 × 8 = 48
11 × 6 = 66　48 ÷ 6 = 8

Write A Story

Calculator Exploration

Divide 10 numbers by 2 and 10 others by 4. Compare the whole number remainders with the remainders expressed as fractions and with the decimals on your calculator.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 20 less than 133
2. 17 + 4 + 7 – 2
3. Round to nearest hundred: 8,279
4. 76 + 12
5. 12 x 0
6. 5 minutes before 12:50
7. Number of centimeters in 3 meters
8. Number of fingers and toes on two boys

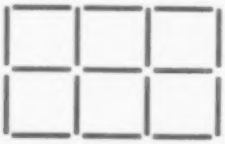
Game of the Week

Crash Cars

There are patterns for two games this week. Both *Crash Cars* and *Broken Hearts* are played by the same rules. Students will need to help you make the game pieces. These are always enjoyed by students!

Problem For the Week

Build this toothpick design. Remove 5 toothpicks and leave only 3 squares that are the same size. Remove 4 toothpicks and leave only 4 squares that are all the same size.



Create a toothpick puzzle for others.

Data Exploration

If the teacher tosses a coin, will heads show up more often than tails? Play this game while you investigate:

The teacher reads a number. Students write that number in either decimal or fraction notation. When the coin is tossed, students who wrote the number as a fraction get a point if the coin shows heads. It the coin shows tails, students who wrote a decimal win a point. (Be sure to tally the number of heads and tails.)

To Discuss

How long did the Wright brothers' first flight on their airplane last? How many years ago was this? What impact does it have on our lives today?

Would you like to travel to outer space on an extended voyage? What are some of the problems for space travelers?

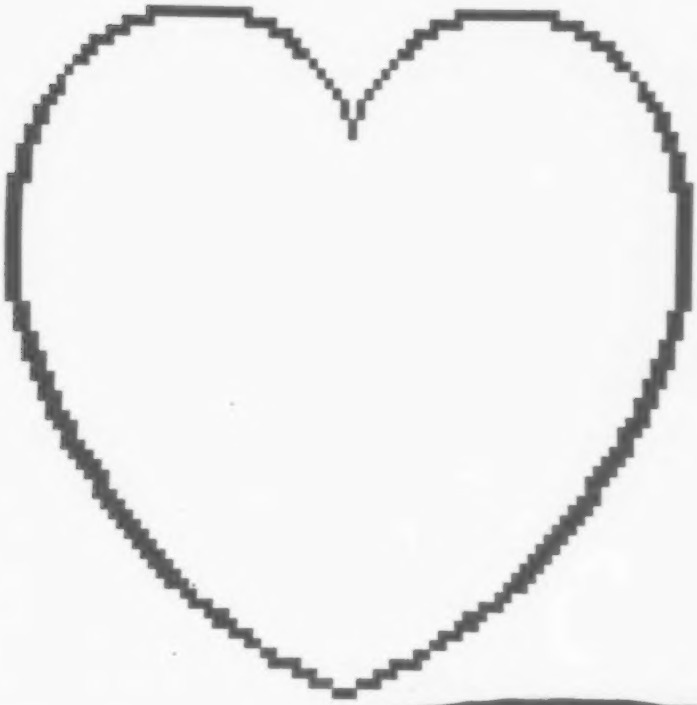
CRASH CARS BROKEN HEARTS

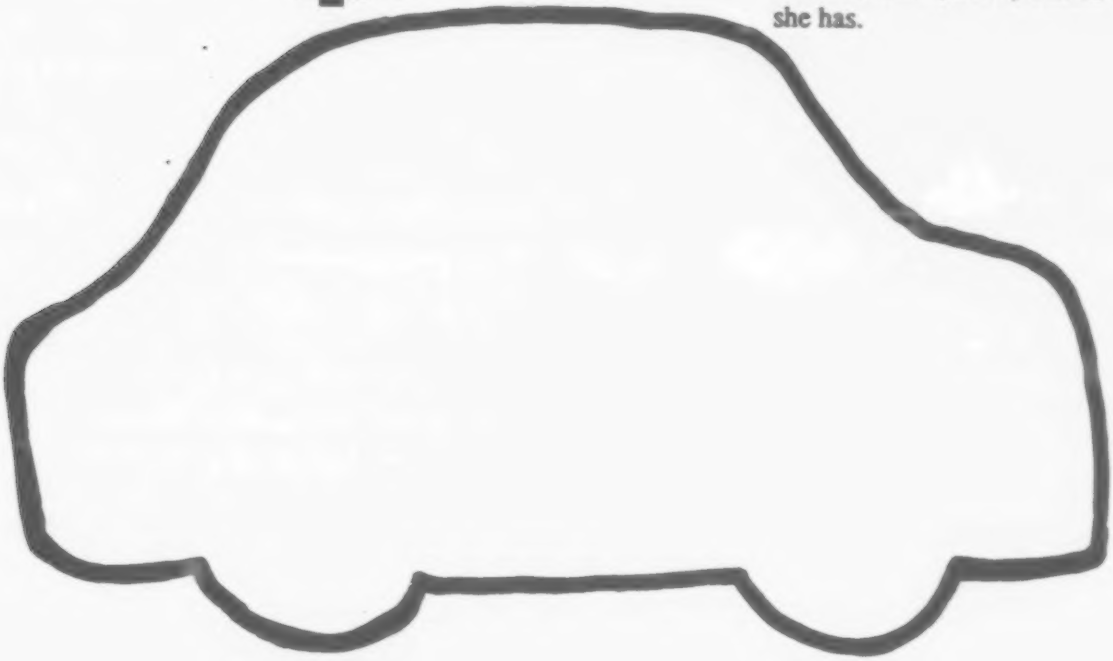
Get Ready

Have students cut out 60 to 80 hearts and 60 to 80 cars. On every ninth card, write "crash" or "broken heart." On the other cards write number facts. The crash cars should be division facts and the hearts should be multiplication facts. Laminate pieces for a more permanent game. Mix up cars (hearts) before play begins.

To Play:

Place game cards face down in a pile. In groups of 3-5 students, take turns rolling a die. Students may collect that many cars (hearts) without looking. One at a time, the student turns over the cards and gives the fact with the answer. If the answer is correct, the student keeps the car (heart). If that one is incorrect, the student returns that one card to the pile, burying it. If the student turns over a car that says "crash" (heart that says"broken"), then the player must put back into the pile all of the cars (hearts) that he or she has.





Week 27

Facts of the Week

32 × 4 = 8
3 × 8 = 24
12 × 10 = 120
120 ÷ 12 = 10

Write A Story

Calculator Exploration

What number could I multiply by 25 to have a product between 462 and 472? What number times 25 gives a product between 738 and 748?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 1 less than 800
2. 24 – 8 + 4 + 1
3. Round to nearest ten: 541
4. 50 – 13
5. 11 x 9
6. The value of 8 quarters and 7 nickels
7. Number of centimeters in 1/2 of a meter
8. 1/2 of 66

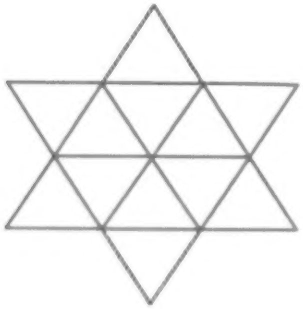
Game of the Week

Multo Tic-Tac-Toe

This is a write-on gameboard. Students play all over the board with the goal of winning three games in a row on the board. Defensive as well as offensive strategies are needed.

Problem For the Week

How many triangles are in this shape?



Data Exploration

Estimate the number of jumping jacks you could do in 30 seconds. Perform the activity. Graph the results. If you jumped for another 30 seconds and then a third 30 seconds (close together), do you think your number would go down? Experiment.

To Discuss

Is it possible to write 12 numbers between 2.4 and 3.1?

What numbers come between 1/3 and 3/4?

How could you explain your response to a student who has been absent and did not hear the class discussion?

Multo Tic-Tac-Toe

2 players
Materials: Gameboard, different colored markers

×	3	5	7	×	2	7	9	×	8	5	9	×	3	4	7
4				3				3				6			
3				6				4				8			
6				2				2				5			
×	4	0	8	×	1	6	9	×	4	2	6	×	9	4	6
6				9				8				2			
8				5				4				7			
7				8				9				3			
×	5	9	1	×	0	3	7	×	0	4	8	×	6	7	3
5				9				7				4			
9				1				2				8			
7				8				3				2			
×	7	3	8	×	2	9	4	×	0	4	8	×	5	9	4
6				6				4				4			
7				8				6				6			
4				3				5				7			

Directions: This game is played like Tic-Tac-Toe. Each player takes turns calling out the multiplication fact and product for any of the 81 small spaces. If correct, the player puts his or hers in the space. If a player makes a mistake, then the other player wins that space. When a player gets three small spaces in a row, column, or diagonal, he or she wins the larger square. The winner is the first player who wins three LARGE squares in a row, column, or diagonal.

Week 28

Facts of the Week

44 ÷ 11 = 4 4 × 8 = 32
11 × 4 = 44 32 ÷ 4 = 8

Write A Story

Calculator Exploration

Calculator Nim: Enter a number less than 200 in the calculator. Players take turns subtracting any single digit number other than zero. Winner is the student who makes zero appear on the display.

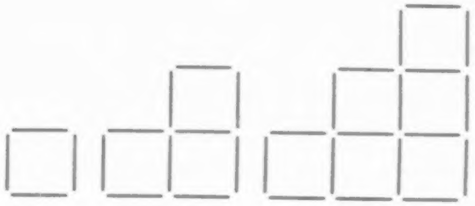
Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. The largest 4-digit number
2. 3 x 2 x 2 + 3
3. Round to nearest hundred: 1,592
4. 21 + 31
5. 7 x 7
6. 18 minutes after 4:10
7. Number of centimeters in 8 meters
8. Triple 5

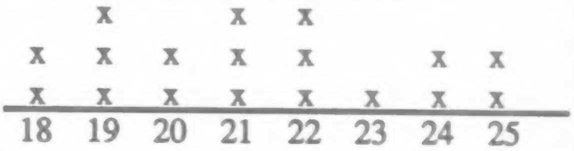
Problem For the Week

How many toothpicks are needed for the staircase where the tallest step is 10 steps high?



Data Exploration

The gremlins have been messing with the computer again! They erased the title and labels on this line plot. Write a story to tell what could it have been about.



Game of the Week

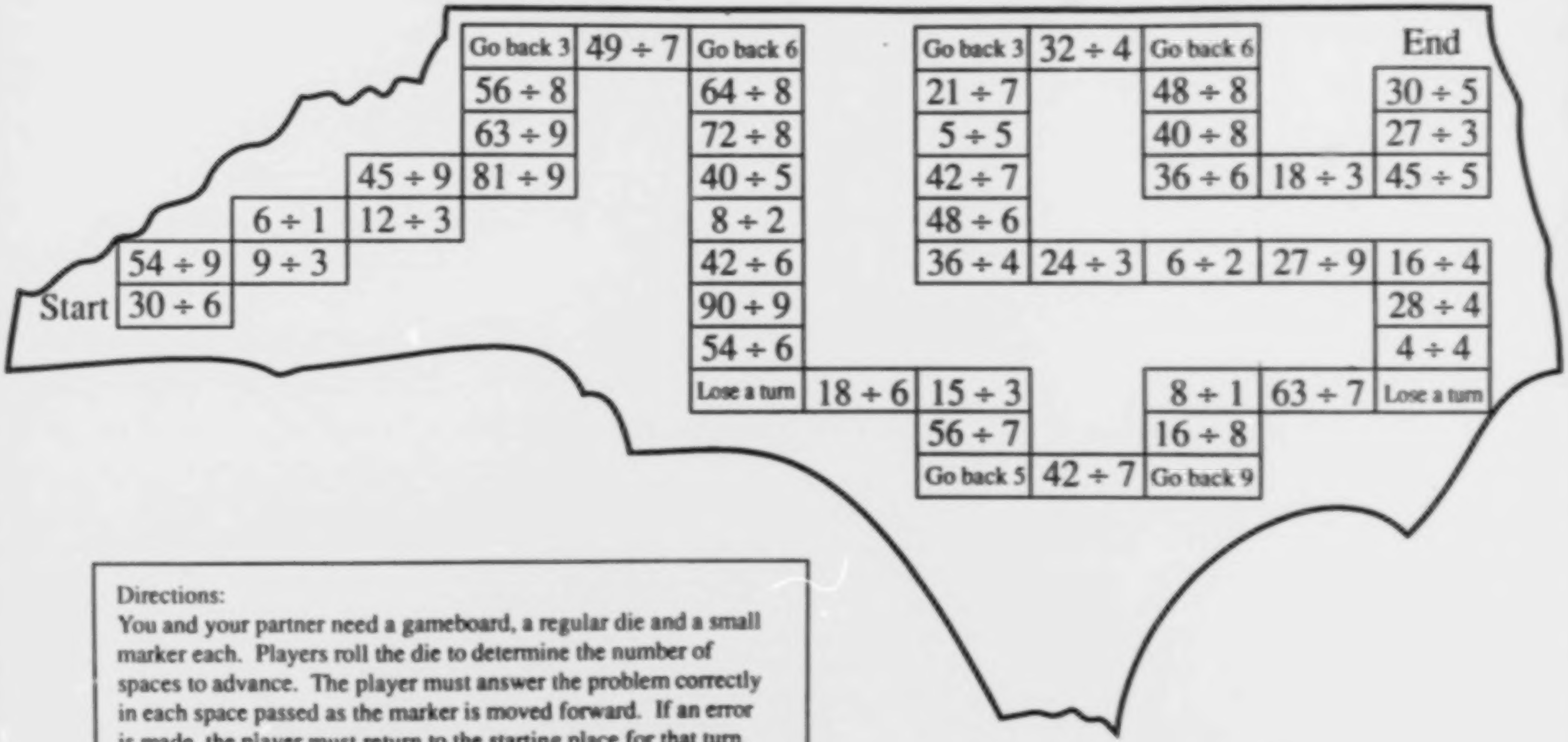
Murphy to Manteo

This game focuses on division facts. Small markers are needed for this gameboard. When students encounter facts they do not know, have them keep a "learning list" to work on the specific facts.

To Discuss

How much allowance do you think a fifth grader should be given each week? Justify your answer. Should there be any "guidelines" for spending this money?

Murphy to Manteo


Start
30 ÷ 6
54 ÷ 9
9 ÷ 3
6 ÷ 1
12 ÷ 3
45 ÷ 9
81 ÷ 9
63 ÷ 9
56 ÷ 8
Go back 3
49 ÷ 7
Go back 6
64 ÷ 8
72 ÷ 8
40 ÷ 5
8 ÷ 2
42 ÷ 6
90 ÷ 9
54 ÷ 6
Lose a turn
18 ÷ 6
15 ÷ 3
56 ÷ 7
Go back 5
42 ÷ 7
Go back 9
16 ÷ 8
8 ÷ 1
63 ÷ 7
Lose a turn
4 ÷ 4
28 ÷ 4
16 ÷ 4
27 ÷ 9
6 ÷ 2
24 ÷ 3
36 ÷ 4
48 ÷ 6
42 ÷ 7
5 ÷ 5
21 ÷ 7
Go back 3
32 ÷ 4
Go back 6
48 ÷ 8
40 ÷ 8
36 ÷ 6
18 ÷ 3
45 ÷ 5
27 ÷ 3
30 ÷ 5
End

Directions:

You and your partner need a gameboard, a regular die and a small marker each. Players roll the die to determine the number of spaces to advance. The player must answer the problem correctly in each space passed as the marker is moved forward. If an error is made, the player must return to the starting place for that turn. Players take turns. The first player who crosses the state and comes to the END space wins.

Week 29

Facts of the Week

12 × 12 = 144   8 × 8 = 64
144 ÷ 12 = 12   64 ÷ 8 = 8

Write A Story

Problem For the Week

There is a class of students standing in a long line. Jenny is the 18th in order from both ends. How many students are there in the class?

Write a letter to your friend to explain how you decided upon your answer.

Calculator Exploration

A number will become a palindrome when it is reversed and added. Investigate the numbers on a hundred chart and color them according to the number of steps it takes for them to become palindromes.

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 2 more than 3999
2. 4 x 2 x 3 – 5
3. Round to nearest dollar: $3.10
4. 17 + 33
5. 9 x 8
6. The value of 5 quarters and 3 dimes
7. Which is longer—14 inches or 14 centimeters
8. 1/2 of 40

Data Exploration

Brainstorm a list of North Carolina tourist attractions. Refine the list to the ten. Have students survey 10 people each to determine favorite attractions from the list. Organize and display the data in an interesting and attractive manner. You might have groups each use a different means of reporting the data.

Game of the Week

Pounce II

We are back to that active game of Pounce with a new board and another set of facts - this time mainly division. If your students enjoy this, you might plan your own version of Pounce for addition early in next year.

To Discuss

Pretend you are a resident of Raleigh, North Carolina. You have planned a vacation to visit New York City, Orlando, Florida, Phoenix, Arizona, and Philadelphia, Pennsylvania. What would be your itinerary?

1	8	7	9	5	12
9					7
8					6
6					5
9	5	7	6	8	18

Pounce II

Get Ready

1. Fix 4 Pounce Buttons on strings for each gameboard by attaching 18" strings to buttons.
2. Make 2 sets of Pounce flash cards per game.
3. Each group of 4 students needs a gameboard, flash cards, pounce buttons on strings, a marker to show the target number, a magarine tub for pouncing, and 10 counters of some kind for each player.
4. During a round, one person is the pouncer and other players hold a string.
5. The pouncer rotates after each round.

Place

Pounce

Buttons

Here

To Play

1. To begin put the marker beside one answer. At each round move the marker clockwise to determine the next target answer. Place flash cards in a stack face down.
2. Players put their pounce buttons in the oval on the gameboard, holding their strings. The pouncer does not have a button but has the pounce cup.
3. The pouncer turns over the flash cards one at a time so that all players may see the fact. If the answer is the target number, the pouncer tries to capture the buttons before they can be jerked away.
4. When the pouncer captures a button, that person must give the pouncer a counter. If the pouncer does not capture a person's button, the pouncer must give the player a counter.
5. Play continues until someone is out of buttons.

Week 30

Facts of the Week

11 × 9 = 99 8 × 6 = 48
99 ÷ 11 = 9 48 ÷ 8 = 6

Write A Story

Calculator Exploration

Consumers use calculators to figure the best buys. Knowing what the numbers mean when you divide money is important. Record prices from a local store, divide, and explain the results. (ex. 4 for $1.35 or 2 for $.99)

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 50 less than 904
2. 8 x 2 + 4 + 5 + 3
3. Round to nearest ten cents: $3.28
4. 55 – 25
5. 12 x 2
6. 20 minutes before 9:35
7. Number of centimeters in 10 meters
8. Which is smaller—1/8 or 2/3?

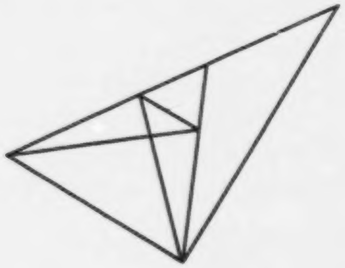
Game of the Week

Multiplication Mark Off

This game uses a regular deck of playing cards to generate the facts. It is a game in which you might consider having students color on the board instead of using markers and send home for parents to see the type of drills you are doing.

Problem For the Week

How many triangles can you find in this shape?



Data Exploration

Cut out examples of graphs from the newspapers. What information is being shown? How could you classify these data displays?

Can you determine who was surveyed or where the data originated?

To Discuss

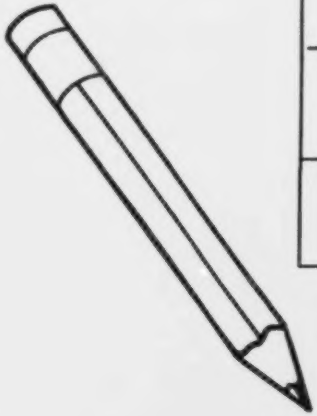
Review your state symbols. Brainstorm with the class a list of additional possible symbols.

How are symbols established for the state?

When was the last symbol adopted?

MULTIPLICATION MARK OFF

12	20	16	40	18	27	64
100	36	4	56	24	30	12
63	0	49	72	25	8	48
48	10	60	0	14	36	9
54	32	27	35	56	49	21
30	16	63	40	144	18	72
42	28	15	60	81	6	24



Use a regular deck of cards to play this game. Let Aces = 1, Jacks = 11, Queens = 12, and Kings = 0.

Each player has 10 markers. At a turn, the player draws two cards and multiplies. If the product is uncovered on the board, the player may capture the spot. The first player to capture 10 spots wins.

Week 31

Facts of the Week

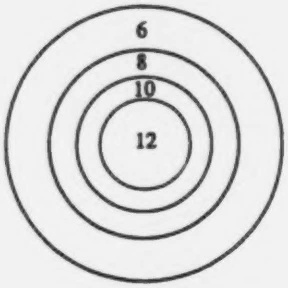
$110 \div 11 = 10$　　$4 \times 6 = 24$

$11 \times 10 = 110$　　$24 \div 4 = 6$

Write A Story

Problem For the Week

If you shoot 5 arrows at this target, how many ways can you get a score between 45 and 55?



Calculator Exploration

Have you ever turned your calculator upside down and been able to read a word? Create some equations whose results will spell BOB or LES or other words!

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write seventy two thousand four hundred six.
2. 3 x 2 x 5 + 7
3. Round to nearest hundred: 3, 745
4. 14 + 46
5. 25 ÷ 5
6. $1.30 less 3 nickels
7. Number of inches in 1/2 of a foot
8. Double 15

Data Exploration

This is a stem and leaf plot depicting the heights of a fourth grade class in centimeters. How does it compare with data from your class?

Boys		Girls	
15	4	15	6 8
14	6 8	14	6 7 7 8
13	2 3 5 6	13	0 2 4 4 6 7
12	0 4 5 8	12	0 2 3
11	7	11	3

Game of the Week

Raleigh Road Race

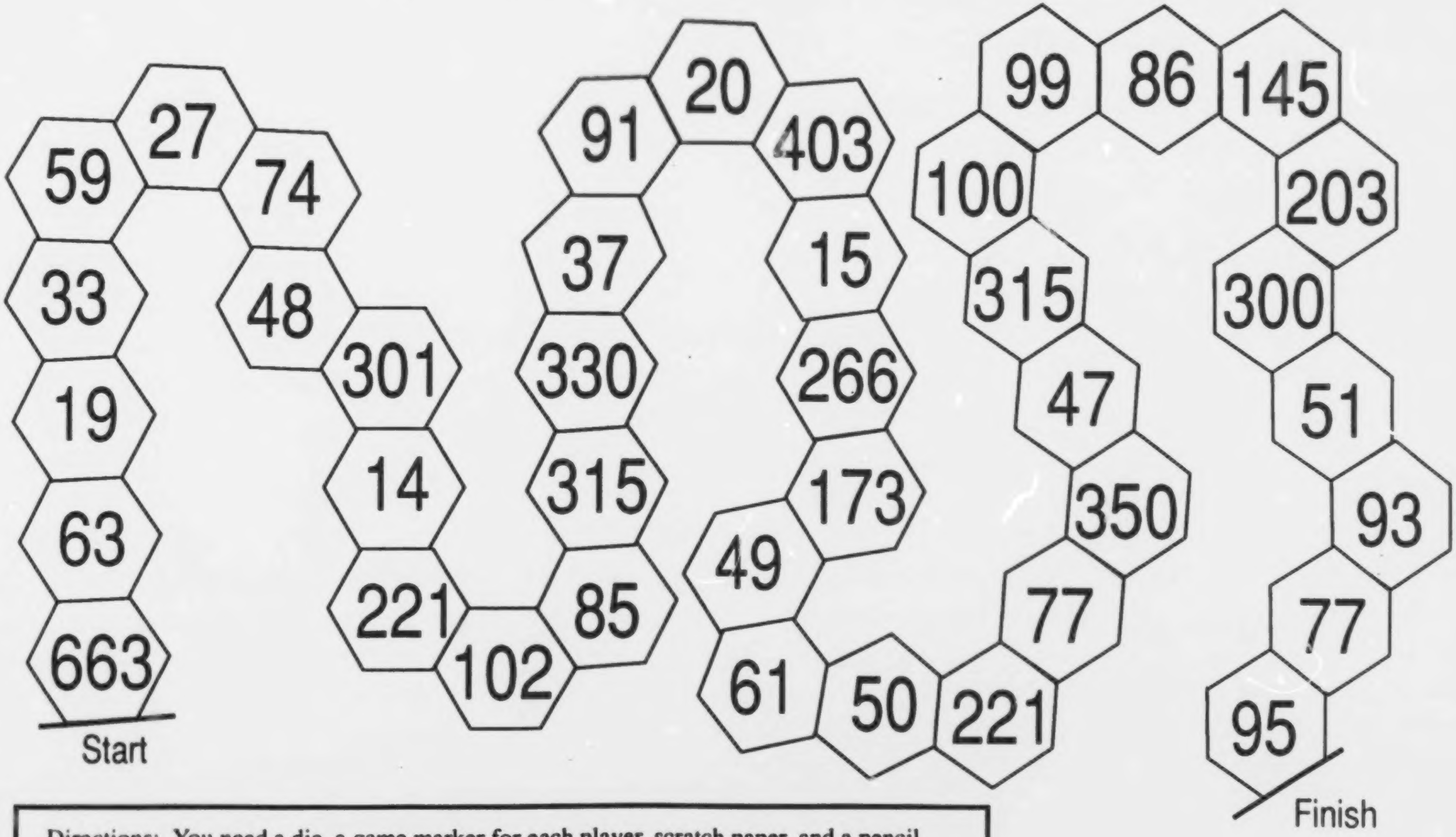
Division with remainders is the focus of this game. The remainders determine the number of moves. Since a roll of the die determines the division problems, the gameboard can be used over and over.

To Discuss

What is an estimate? Are estimates more than just guesses?

Give some examples of when estimates are useful and examples of when you need exact information.

The Great Raleigh Road Race


663
63
19
33
59
27
74
48
301
14
221
102
85
315
330
37
91
20
403
15
266
173
49
61
50
221
77
350
47
315
100
99
86
145
203
300
51
93
77
95
Start
Finish

Directions: You need a die, a game marker for each player, scratch paper, and a pencil. Players roll the die and use that number as the divisor for the first place on the board. Divide on the scratch paper. Then, move the number of spaces indicated by the **remainder**. At each turn divide the number where the player's marker is located by the number on the die. If no remainder, no spaces are moved. First to cross the finish line wins.

Week 32

Facts of the Week

9 × 7 = 63　　7 × 8 = 56
63 ÷ 8 = 7　　56 ÷ 7 = 8

Write A Story

Calculator Exploration

Play Memory Target 20. Players take turns entering 1 or 2 and M+. Because the sum will not appear, players must add in their heads. When players thinks they have reached 20, press the MR

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Which is smaller? 5,001 or 5,862
2. 5 x 0 x 4 + 12 – 9
3. Round to nearest thousand: 6,199
4. 60 – 12
5. 18 ÷ 6
6. 15 minutes after 12:55
7. Number of inches in 10 feet
8. 1/2 of 100

Game of the Week

Rotten Egg
and
Lost in Space

These two games follow the same format as *Crash Cars*. Different sets of facts make them interesting for players.

Problem For the Week

Take the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9. Use each number only once. The numbers must total the same when they are added together horizontally, vertically, and diagonally. Find more than one solution.

Data Exploration

What happens when the same data is presented with different scales? Revisit questions such as number of absences during one week or the ways that students come to school. Display the data in bar graphs which have different scales. Are your impressions different based upon the visual displays?

To Discuss

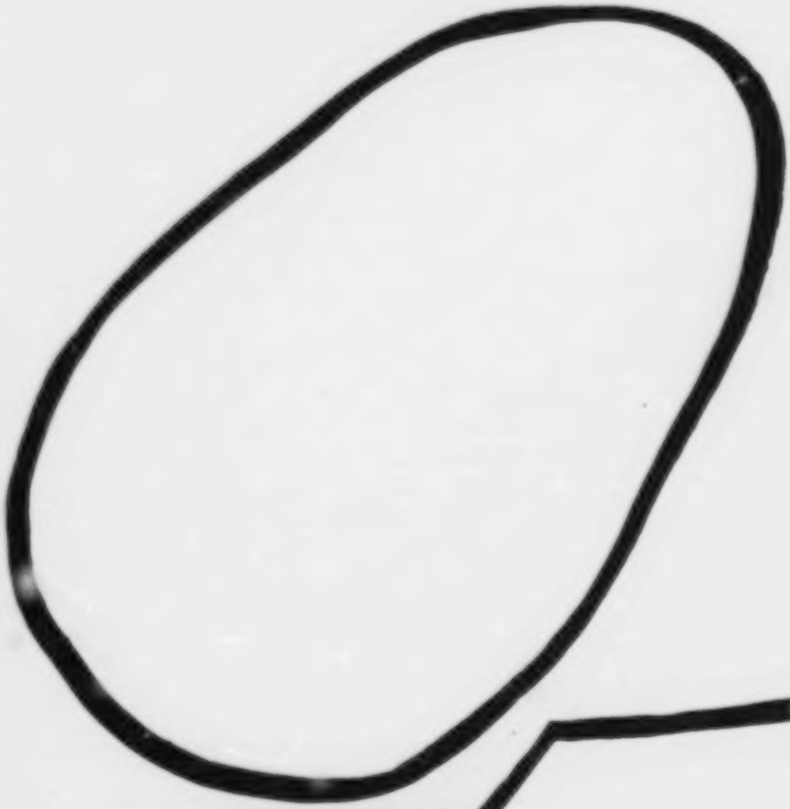
In how many different ways can you design a box-shaped building using exactly 24 cubes?

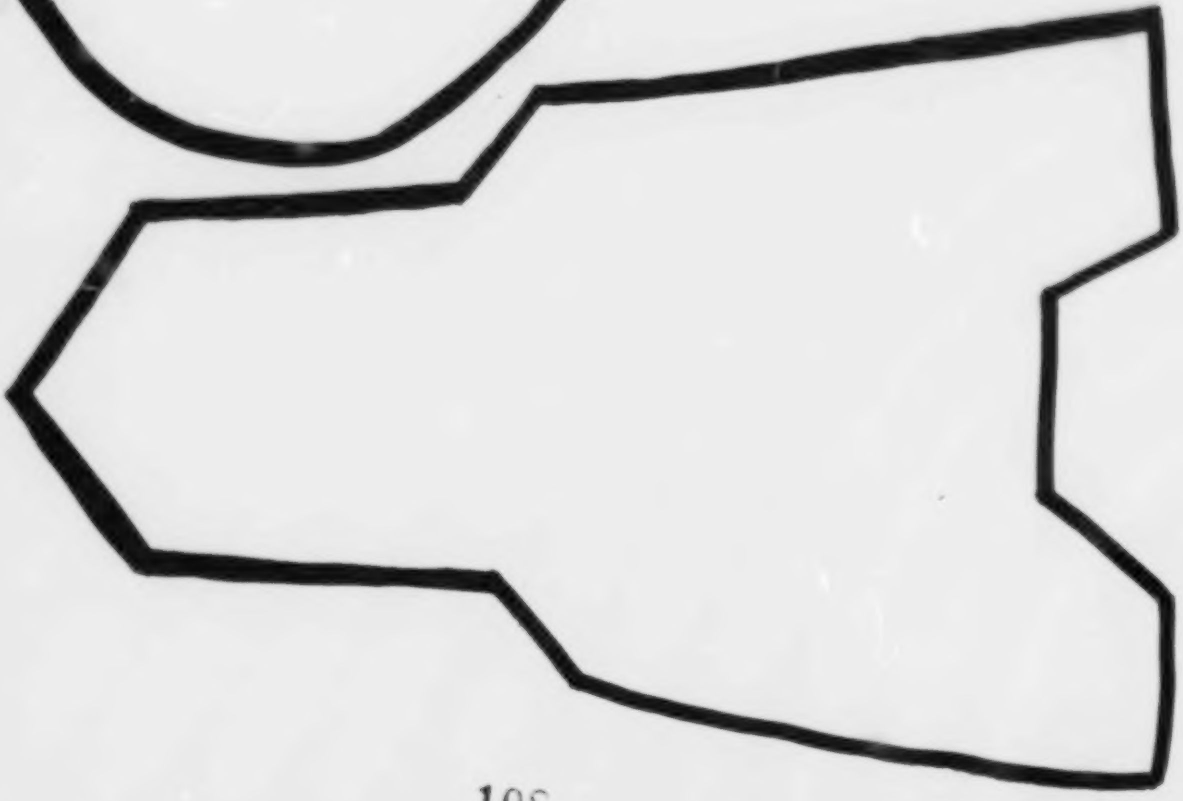
What would your box-shaped buildings look like if you used 36 cubes?

ROTTEN EGGS
LOST IN SPACE

To the teacher:

Preparation and directions for these games are the same as for "Crash Cars" and "Broken Hearts" except that the "Rotten Egg" game is for harder addition and subtraction facts. The "Lost In Space" game uses a combination of addition, subtraction, multiplication and division facts.





Week 33

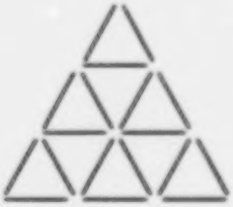
Facts of the Week

9 × 6 = 54   7 × 7 = 49
54 ÷ 9 = 6   49 ÷ 7 = 7

Write A Story

Problem For the Week

Remove 4 toothpicks and leave 5 triangles.



Calculator Exploration

Membership in the bowling club costs $5.00. It costs 25¢ for members to bowl and 75¢ for non-members to bowl. How many times would a person need to bowl to have an advantage in being a member?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 60 more than 350
2. 7 x 8 x 1 − 6 + 2
3. Round to nearest ten: 681
4. 59 + 27
5. 4 x 12
6. $2.00 less 3 quarters
7. Which is shorter? 1 yard or 24 inches
8. Triple 20

Data Exploration

Read the book *Dad's Diet* by Barbara Comber. Have students describe the mathematics found in the book. Divide the class into 4 to 6 groups. Have each group decide upon an investigation they would like to pursue, gather the data, and create an appropriate display.

Game of the Week

Musical Math and Social Studies Review

Get ready for the end-of-grade tests with this fun review of math skills and social studies. Directions, questions, and a student answer sheet follow.

To Discuss

Should schools in North Carolina adopt year around schedules? What factors might influence the responses in different communities? Would you expect differences in the responses of different age groups?

End-of-the-Year Review: Musical Mathematics and Social Studies

(played similar to musical chairs)

End-of-the-year reviews are a part of every classroom. Here is one idea for an integrated review; hopefully, you will add to these "factual" questions some "thought" questions which are very important but which do not fit the format of this review. You may also want to use the question in other games. There are six pages of questions.

Cut each review question out and glue it on a 3 x 5 card. *Number the questions to make three sets of 1-30. Place one card on each child's desk. Each student should have a numbered grid answer sheet or notebook paper numbered 1-30. (Note: you may decide to make duplicate copies of the questions so that you could have a five day review with fewer questions each day.)

Students will move around the room from desk to desk, answering one question at each stop. Music will cue students when to move. When you are ready to begin, start the music. The children move from desk to desk. When the music stops, the children should write the answer to the question on the desk where they've stopped in the the appropriate grid box. (Be certain that calculators are available for math problem solving questions.)

When the music starts again, the students start moving to other desks. As before, when the music stops, the students answer the question on the desk where they've stopped. This procedure continues until all the boxes on the grid have been filled in.

When everyone has returned to his or her own desk, go over all the questions, marking correct answers. Award points for all correct answers and have students use their calculators to determine the team's score for that round. At the end of three rounds, find the winning review team.

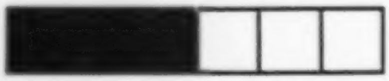
*(You have enough cards to make three sets of 30 with six extras.)

End-of-the-year review cards. Add your own questions to personalize the review.

How much time has elapsed since the Civil War?

19,542

Round to nearest thousand



Write two fractions for the this figure.

How much time has elapsed since Giovanni de Verrazano explored the coast of North Carolina?

Cube	Tetrahedron	Cone	Triangle

Which figure is not three dimensional?

Draw two intersecting lines.

What are the dates on the North Carolina seal and the state flag?

What do the dates represent?

Give a real-world example for parallel lines.

853,246

What digit is in the ten thousands place?

Put these numbers into a stem and leaf plot: 28, 34, 26, 45, 23, 28, 31, 37, 42, 45, 58, 21, 24, 35, 39

1/4 = .25

True or False?

Write the decimal number one tenth.

What are three ways in which North Carolina is inter-dependent?

Draw an acute angle.

Draw and label a right angle.

Explain the use of time zones.

End-of-the-year review cards. Add your own questions to personalize the review.

What are three different types of maps?

How many geographic regions does North Carolina have?

Name them.

Draw an obtuse angle.

How many major rivers have their source in the mountain region?

Continue the pattern. . .

4, 16, 5, 25, 6, 36, 7, ___, ___, ___

What is the east-west distance across North Carolina?

Where does North Carolina rank in size among the fifty states?

Name something taller than two meters in height.

Name something about six inches wide.

Which is the most southern county in North Carolina?

Which is the most western county?

598,076

What digit is in the thousand's place?

What North Carolina county has the largest population?

Which has the smallest?

If Tuesday is on the fifth, what is the date of the third Tuesday?

What are the three branches of state government?

How many calories are in one dozen eggs if each egg has 75 calories?

Name three of North Carolina's five largest cities.

What is the appropriate kind of measurement for the width of our classroom?

End-of-the-year review cards. Add your own questions to personalize the review.

Fourth grade students collected 608 cans. There were 429 juice cans. How many cans were not juice cans?

If 36 of North Carolina's 100 counties have a new plan for roadside beautification, how would you write that number as a decimal? as a fraction?

Which direction would you travel to get from your school to the state capital?

Who is North Carolina's governor?

How many have served North Carolina since it became a state?

How high is North Carolina's highest mountain?

In which county is it located?

How many major North Carolina rivers flow directly into the Atlantic Ocean?

There are 82 pages in a booklet. If we produce 7 copies, how many pages will be printed?

In what way is a globe better than a flat map?

How many degrees are there around the earth at the equator?

If there are three yards of string left on the ball, how many 6" lengths can you cut?

A hexagon is a figure with how many sides? How many sides does a pentagon have?

How many states share a border with North Carolina?

Name them.

9004 + 56 + 825 =

If you round 357 to the nearest 10, what would it be?

Draw an example of perpendicular lines.

Name three kinds of landforms found in North Carolina.

How much time has elapsed since North Carolina became the twelfth state in the United States?

What holds more - a teaspoon or a tablespoon?

How many years does our Constitution allow a governor to serve?

Which holds less - a pint or a cup? How many cups are in a gallon?

How many senators does North Carolina have in the state legislature?

Tell something that is measured in liters.

How many senators does North Carolina have in the United States Senate?

If it is 2:45 p.m., how many hours is it until 8:00 p.m.?

End-of-the-year review cards. Add your own questions to personalize the review.

A room is 8 feet by 12 feet. What is the perimeter?

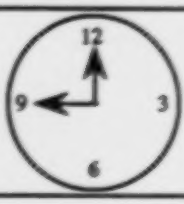
How many representatives serve in North Carolina's General Assembly?

If lunch costs $1.15, how much does lunch cost for a whole year of school?

If each vowel is worth 25¢ and each consonant is worth 1¢, how much is "mathematics" worth?

How many representatives does North Carolina have in the United States House of Representatives?

What was the time three hours and forty minutes ago?



How many electoral votes does North Carolina have?

If it is 2:00 p.m., how many hours is it until 11:30 p.m.?

End-of-the-year review cards. Add your own questions to personalize the review.

Write a related division fact for
8 x 5 = 40.

Which is greater -
8 x 4 or 120 ÷ 3?

What are five agricultural
crops in North Carolina?

What are three important
manufactured products in
North Carolina?

Estimate the length of this line.

What are five important
natural resources found in
North Carolina?

(33 + 65) - 5 = ?

What are five services
provided by state government?

What are three major North
Carolina exports?

Write a related multiplication
fact for 27 ÷ 3 = 9.

What is an important recreational
activity in each of North Carolina's
regions?

25 ÷ 2

What is the remainder?

Name two county public officials
who are elected by the voters.

Mountain	Height
Mt. Sterling	5,835
Mt. Hardison	6,134

How much taller is Mt. Hardison?

What is the median temperature
of these readings off a thermometer?

72^0 68^0 65^0 74^0 79^0 59^0 76^0

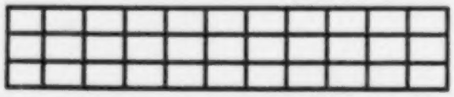
How many hundreds are there
in 2,645?

End-of-the-year review cards. Add your own questions to personalize the review.

This stem-and-leaf plot shows how many cans each person collected for recycling. Write the median number of cans collected.

1	0 2 5
2	8 8 8 9
3	4 5 6 7
4	1 1 2 5 8 8 9
5	1 7 8

What are three important mineral resources in North Carolina?



What is the area of this figure?
What is the perimeter of this figure?

How is a compass rose used?

Is there enough information to solve this problem? If not, what is missing?
There are 10 leaves on each branch of a tree. How many leaves in all if the tree is 5 feet tall?

How many tens are there in 456?

What are three ways in which North Carolina is changing economically?

Which is heavier, 5 pounds of sugar or 75 ounces of chocolate?

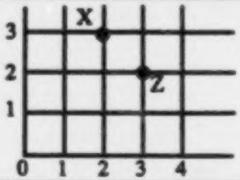
Explain the use of a map legend.

△ + □ = 15
△ x 4 = □
What is the value of the △ ?
What is the value of the □ ?

How many faces does a triangular-based prism have?

Use the ruler to draw a quadrilateral with a perimeter of 12 centimeters.

How can you recognize the eastern edge of the Piedmont?



Which letter is at (2, 3) in the grid?

I added 15 to a number, divided it by 3 and the result was 8. What number did I begin with?

Draw a picture of North Carolina's flag.

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30

Week 34

Facts of the Week

9 × 7 = 63
63 ÷ 9 = 7
6 × 7 = 42
9 × 9 = 81
81 ÷ 9 = 9
42 ÷ 6 = 7

Write A Story

Calculator Exploration

When you add three consecutive numbers, the sum is between 1030 and 1040. What could the numbers be?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 2 less than 5000
2. 4 x 8 x 1 x 0 x 7
3. Round to nearest hundred: 3 219
4. 81 – 14
5. 72 ÷ 9
6. 35 minutes before 4:00
7. Number of yards in 21 feet
8. Which is longer—1/4 or 1/16?

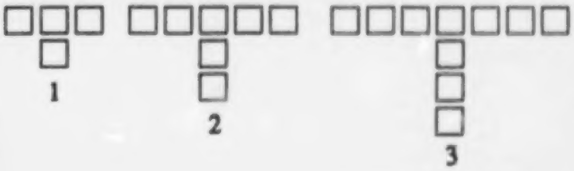
Game of the Week

"I Have, Who Has"

Continue your end-of-the-year review with this oral activity. You could have students enlarge the "deck" by writing other statements and questions.

Problem For the Week

Using blocks to build "T's", how many would be needed for the tenth "T"? Each picture is called a term. The first term has 4 blocks; term 3 has 10 blocks. How many blocks are needed to build all 10 terms?



Data Exploration

Make a list of everything that uses electricity in peoples' houses. For a period of 24 hours tally the number of times you use any household item that is powered by electricity.

Choose one electrical item and record the amount of time you use that item.

To Discuss

When natural disasters such as hurricanes, tornadoes, or floods occur, communities are often left without electricity for days at a time. What are the problems that families would have to deal with in these situations? What are some problems that would affect the entire community?

North Carolina "I Have, Who Has"

This activity focuses on listening and mental math skills.

Directions: Cut out and paste each section on a card. Distribute cards to students (all cards must be used. One student reads information on his card, other students mentally do math problems and student who has answer reads his card. Play continues until all cards have been used and last question reverts to first card used.

I have 50 (members in the North Carolina Senate).

Who has 12 + 12?

I have 43.

Who has 6 + 6?

I have 24.

Who has 82 more than 100?

I have 12 (number of congressonal districts in North Carolina).

Who has 3 more than 960?

I have 182 (square miles in North Carolina's smallest county - Chowan).

Who has 30 ÷ 6?

I have 963 (square miles in North Carolina's largest county - Sampson County).

Who has 5 x 5?

I have 5 (the number of years spent building the Biltmore House).

Who has 12 - 5?

I have 25.

Who has 1000 + 500 + 80 + 7?

I have 7 (the number of continents).

Who has 6+ 7?

I have 1587 (the year Virginia Dare was born).

Who has 14 - 6?

I have 13 (North Carolina is one of the original 13 colonies).

Who has 6000 + 600 + 80 + 4?

I have 8.

Who has 1000 less than 2705?

I have 6684 (the height of Mt. Mitchell - tallest peak in Appalachian Mountains - in feet).

Who has 4 x 5 + 3?

I have 1705 (year first town was established in North Carolina).

Who has 3 x 3 + 5?

I have 23.

Who has 7 x 6 + 1?

I have 14.

Who has 7 x 4?

I have 28 (the weight of the largest gold nugget found in North Carolina).

Who has 1000 + 900 + 3?

I have 4 (the Governor of North Carolina is elected for 4 years).

Who has 37 more than 500?

I have 1903 (the year the Wright Brothers flew the first airplane).

Who has 10 x 10?

I have 537 (the distance from Manteo to Murphy in miles).

Who has 9 + 6?

I have 100 (North Carolina has 100 counties).

Who has 12 ÷ 4?

I have 15.

Who has the value of 15 tens?

I have 3 (North Carolina is divided into three geographic regions).

Who has 210 – 2?

I have 150 (the age of the state capitol building).

Who has 100 more than 228?

I have 208 (the height of the Cape Hatteras lighthouse in feet).

Who has the value of 3 quarters?

I have 328 (the length of North Carolina's coastline in miles).

Who has 1 + 6 + 3?

I have 75¢.

Who has 1000 less than 77,000?

I have 10 (North Carolina is the 10th most populated state in the United States).

Who has 45 ÷ 5?

I have 76, 000 (miles of highways in North Carolina).

Who has 20 ÷ 5?

I have 9.

Who has 25 + 25?

To add more cards to your "North Carolina I Have, Who Has" deck, delete the last card from the existing set and fill out more questions on these cards. The first and last cards have been prepared for you. Each card should contain the answer to the previous card and a new clue. Do not use the following numbers since they are in your deck already: 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 23, 24, 25, 28, 43, 50, 75, 100, 150, 182, 208, 328, 537, 963, 1587, 1705, 1903, 6684, 76,000.

I have 9.	
	Who has 25 + 25?

Week 35

Facts of the Week

9 × 8 = 72 72 ÷ 9 = 8 6 × 4 = 24
9 × 5 = 45 45 ÷ 9 = 5 24 ÷ 6 = 4

Write A Story

Calculator Exploration

Three numbers are added together. Two of them are three digits and one is a two digit number. The sum is 514. What could the numbers be?

Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. Write nine hundred thousand
2. 3 x 9 + 3 ÷ 5 + 2
3. Round to nearest thousand: 9,125
4. 93 + 13
5. 36 ÷ 4
6. $5.00 less $1.50
7. Number of centimeters in 6 meters
8. Double 63

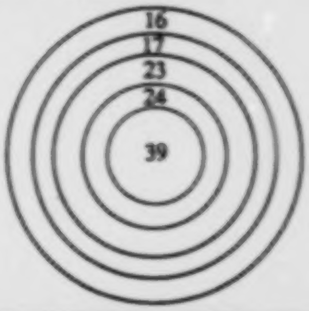
Game of the Week

Summer Solitaire

Students need only a deck of cards (or make a special game set) to practice addition to 13. The challenge is to beat "Solitaire" while keeping sharp on the sums to 13. A fun review for summer!

Problem For the Week

An archer shot 6 arrows and made a score between 100 and 125. Where could his shots have landed on the target? How many different ways could he have shot?



Data Exploration

Have students make a family tree that shows three or four (if they can) generations. Notice that family trees are examples of "graphic organizers".

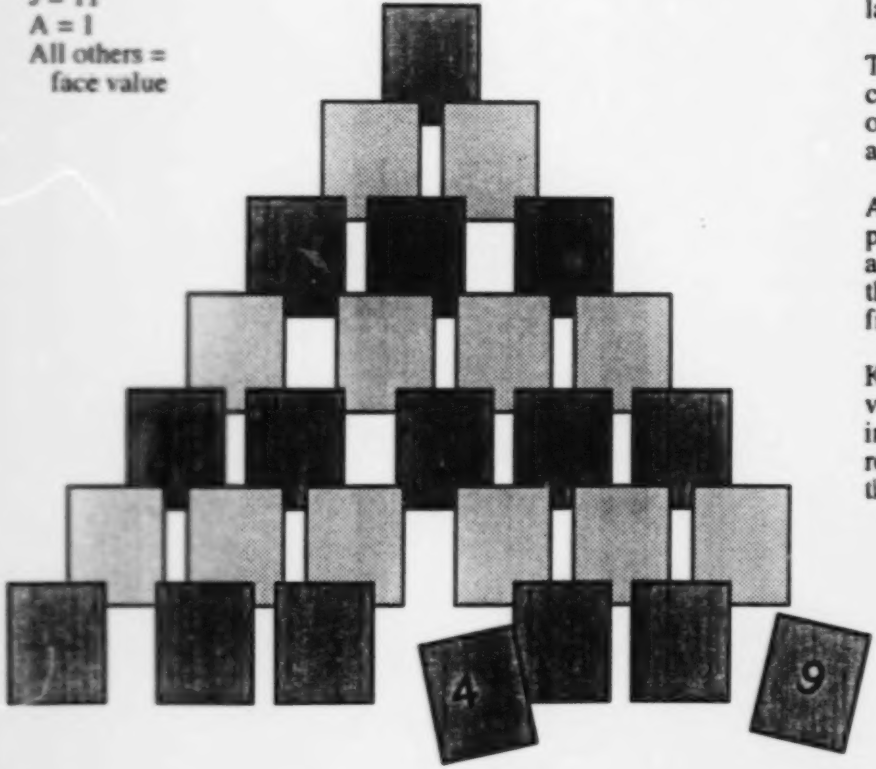
Are families smaller now than they used to be? How might you investigate this?

To Discuss

Plan a week's vacation across the state. What cities and places would you like to visit? Calculate the distances you will travel. What kind of budget would you need for the trip?

Summer Solitaire

K = 13
Q = 12
J = 11
A = 1
All others =
face value

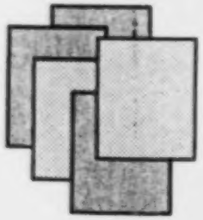


Shuffle a regular deck of cards and lay them out in a pyramid as shown. Start at the top with one card and add one more card in each row until the last row has seven cards. Place cards face up.

To play, you may remove the cards whenever two cards add to 13 and they are not covered up by other cards. Kings count 13 and can be removed as soon as they are uncovered.

As you play, you will go through the remaining part of the deck one card at a time. If you can add any card that is not covered in your pyramid to the card you turn over, you may remove the card from your pyramid.

Keep score for each round. Your score is the total value of the cards you removed from the pyramid in sets of13. The pyramid's score is all cards remaining in the pyramid plus those not used in the deck.



Week 36

Facts of the Week

9 × 4 = 36 36 ÷ 9 = 4 8 × 4 = 32
9 × 2 = 18 18 ÷ 9 = 2 32 ÷ 4 = 8

Write A Story

Calculator Exploration

Write ten problems in the following pattern: odd number divided by 2. What does the remainder in each case represent? Is this true for large numbers divided by 2?

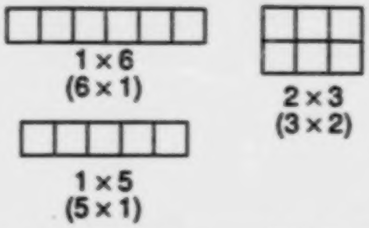
Mental Math

Number your paper from 1 to 8. Write your answer as the questions are called out. Each question will be repeated one time only.

1. 80 less than 1000
2. 9 x 6 + 6 – 20 + 2
3. Round to nearest hundred: 9,875
4. 72 – 15
5. 12 x 3
6. .. 25 minutes after 6:45
7. Which is longer—120 centimeters or 1 meter?
8. Triple 33

Problem For the Week

It is possible to make a rectangle with any number of cubes. For example, with 6 cubes you can make 2 rectangles. But with 5 cubes you can only make 1 rectangle.



How many numbers can you find that will allow you to make only one rectangle?

Data Exploration

What are you and your classmates planning for the summer? Decide upon the question you should ask to gather the information and make a display to best show summer plans.

Game of the Week

Create a Game

What was your favorite number facts game? With a partner, design a North Carolina number facts game to leave in the classroom for next year's students. Color the gameboard, write the rules, and make the gamecards. Be sure to try it out!

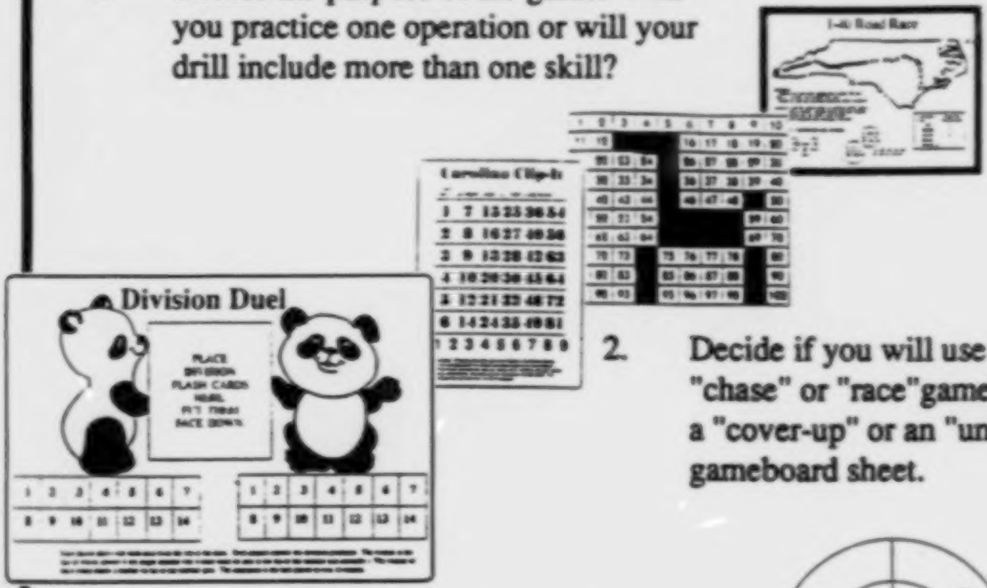
To Discuss

What was the most interesting social studies and math activity this year?

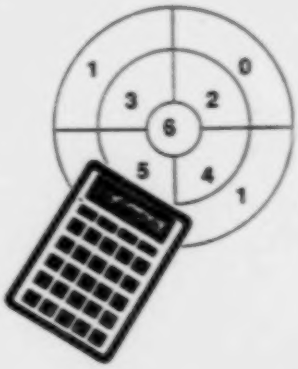
Write a letter to the fourth grader who will have your desk next year and let this student know what will be the most interesting part of the year.

CREATE A GAME

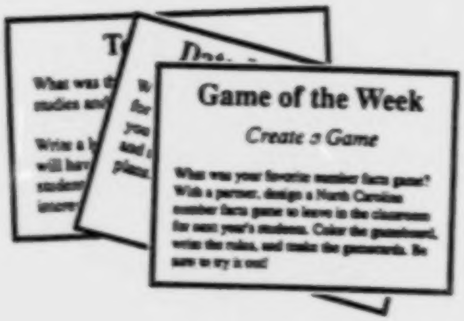
1. Decide the purpose of the game. Will you practice one operation or will your drill include more than one skill?


I-40 Road Race
Carolina Clip-It
Division Duel
PLACE DIVISION FLASH CARDS HERE. PUT THEM FACE DOWN.

2. Decide if you will use a "chase" or "race" gameboard, a "cover-up" or an "uncover" gameboard sheet.



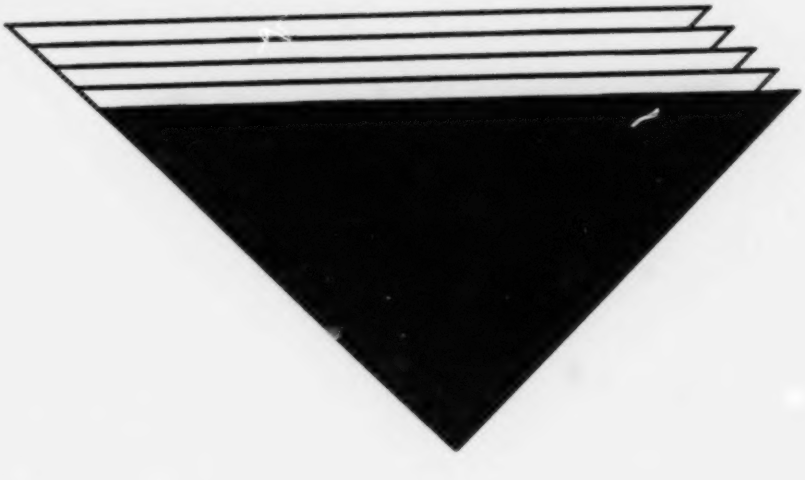
3. Are you going to use dice, a spinner or cards? Will you need other manipulatives or game pieces?


Game of the Week
Create a Game

4. Write a set of rules which describe how you play the game. How do you win?

5. Make a rough sketch of your gameboard to see if everything fits. Create a final gameboard on stiff paper. Color it and add illustrations. Make necessary gamecards and put rules on gameboard or direction cards.

COMPETENCY GOALS AND OBJECTIVES



Creating an environment which promotes critical thinking and nurtures creativity is a challenge for all educators. Teachers need to help student build positive self-concepts. They must have high expectations for the achievement of all children.

Encouraging conversations, providing hands-on activities, and building upon students' interests are successful strategies. Integrated units and opportunities for cooperative learning are other ways to make mathematics meaningful and fun.

Active lessons require that students have clear guidelines and know the teachers' expectations. Be certain that you:

- can clearly state the purposes of the lesson.
- provide time for exploration with any manipulatives you plan to use.
- prepackage manipulatives and organize materials so that students can be responsible for their distribution and clean up.
- communicate your expectations to students.
- relate manipulative explorations with the symbols used to record the ideas.
- value processes and thinking as much as anticipated "correct answers."

The learner will identify and use rational numbers.

1

1.1 Within meaningful contexts express numbers (up to six digits) in a variety of ways, including oral and written form.

Notes and textbook references

A. Each student needs digit cards: 0 to 9. The same activity can be completed many different times and at different levels of difficulty by drawing 3, 4, or 5 digit cards. Have students place their cards face down and draw a certain number. Extra cards remain in a pile to the side. Using only those cards drawn, ask students to

- create the largest possible number
- create the smallest possible number
- write the number words for the numbers created above
- tell what 10 more than their number would be; 100 more; 10 or 100 less
- compare number with partners (determining whose is larger, smaller, middle number)
- build number closest to 500 (5000 or 50,000)
- make an odd number
- make a number that is a multiple of 5
- create a number between 100 and 400 (1000 and 4000 or 10,000 and 40,000)

B. On a rainy day, play "What's My Number?" Each student writes a 4-digit number on a card. These are pinned or taped to other students' backs so that children cannot see their own numbers. Students move around the room asking questions (which may be answered by "yes" or "no") to guess their number.

C. Make "checkbooks" for each student. Give each student a beginning balance and allow them to earn additional deposits for doing jobs in the classroom, bringing articles or books from home to contribute to class discussions, interesting or especially creative writing, etc. Students would write checks to "rent " their desks, use pencil sharpeners or the water fountain, "purchase" construction paper and "lease" manipulatives.

You could create a complex classroom economy and carry the project through the semester.

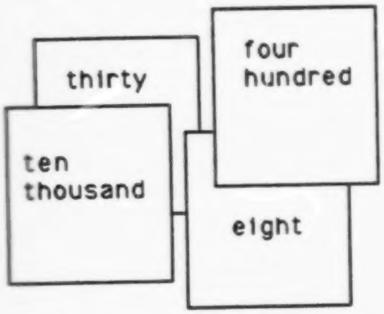
Notes and textbook references

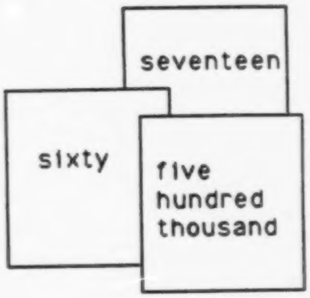
D. Have students create number stumpers. Give examples such as this one to be certain that everyone understands the task. Tell students to write four to six clues for each number.

- I am an odd number between 500 and 600.
- I am less than 60 tens.
- I am a multiple of 5.
- The sum of my digits is 13.

Record ten large numbers on a tape, allowing time for students to listen, write and then listen to check. After individuals have used the tape, give them an answer key to check themselves.

E. Draw on the chalkboard place holders for six digit numbers. Give groups of students cards such as these and have them write their number in standards form. Have other students read the number.





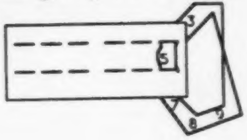
F. Whenever important dates in North Carolina history are discussed, have the students write them in both standard and word form. Talk with children about the way we note years as B.C. and A.D. and what 1992 means (i.e. one thousand nine hundred ninety-two years anno domini *in the year of the Lord*).

1.2 Use models to explain how the number system is based on 10 and identify the place value of each digit in a multi-digit numeral.

A. What is the population of the state of North Carolina? Which digit is in the ten thousands place? the hundreds place? the hundred thousands place?

B. How much is a thousand? With another class use base 10 materials and cubes made from centimeter grid paper to model a thousand. Using these cubes, determine how many flats (models of 100) it takes to make a thousand; how many longs (models of 10) it takes to make a thousand. How many of these cubes would it take to model a million? What process did you use to solve this problem?

C. Have each student make an odometer which could go up to 100,000 miles. Use large index cards or pieces of old file folders and paper strips to slip through as the numbers. Ask students to explain why each strip only needs 0 through 9 on it.



Notes and textbook references

D. How many different ways can you model 4-digit numbers using base 10 materials? Make the number 1,358 using base 10 blocks. For example:

- one cube
- three flats
- five longs
- eight ones

or

- thirteen flats
- four longs
- eighteen ones

E. Explore place value with a calculator. Have students display a number such as 247 on their calculators. Ask them to tell their partners what they could do to change the 4 to a 5. They are not allowed to clear the display and reenter the number. Or your direction might be for them to find a way to show a 0 in the hundreds place. Be sure to have students tell their plan before they enter anything so that both partners can see if the plan works. Repeat the process many times with 3-digit numbers before going to 4, 5, and 6-digit numbers.

F. Play "Beat the Calculator." Make pairs of cards showing expanded forms of numerals (some easy, such as 90 + 9 or 70 + 6, and some more difficult such as 6000 + 40). Choose one student to be the "Calculator Kid." This student will try to show the number on the calculator before another student can write it on the board or overhead. The student who can show the number in standard form first gets the point.

5000 + 30 + 4
20,000 + 600
300,000 + 900
8000 + 200 + 3
9000 + 50 + 7
50,000 + 80
1000 + 200 + 6

G. Have four to six students stand at the front of the class. Give each student a large card with one digit (hand out numbers randomly). The leader asks the class specific questions such as, "Which student is in the thousands place? What place value is John? Who can read the number we have made? How could we rearrange the students to show the smallest possible number? the largest possible number? the number closest to 3500?"

H. Using number tiles 0 to 9 (or for a concrete level, use place value mats and base 10 materials), have children show the numbers you call out. For example: Show me a number that is less than 4573. Show me a number that is greater than 1342 but less than 1436. Show me an odd number that is greater than 1426 but less than 1458. Show me a number that is one less than 2789. Notice that some "show me" statements have one correct answer, while others are more open-ended!

Do you have a student (students) who are very weak in place value? Try arranging for the student to become a "helper" in a second grade class working with 10's and 1's with a partner, making bean sticks, or cutting computer strips to model place value. Let your students help others having trouble and at the same time strengthen their understanding of place value.

1.3 Compare and order numbers less than one million.

Notes and textbook references

A. Use a population chart from your social studies book or one of the data sheets in the *Teacher to Teacher* section. Have the students put in order, by population or area, the 10 largest cities or counties. Have them identify and order the 10 smallest counties.

B. Give each student a set of 12 to 25 index cards and marker. Ask them to write names of towns in North Carolina whose populations are greater than 1000 and less than 1,000,000 on each card (include town and population). When the cards are made, students in pairs or small groups can play "Population Challenge." Shuffle the cards together and then deal out all cards. Each student puts his/her top card down on the table and the student with the highest (or lowest) population wins the cards. The winning student must correctly read aloud all numbers or he/she does not get the cards.

C. Using the same cards from 1.3B, select groups of students and ask each student to randomly select a card from the deck. Then ask the students in each group to physically order themselves from highest to lowest or vice versa. The whole class can check the ordering of individual groups.

D. Make puzzle sentence cards. Students take four to seven index cards and on one side write words to make a sentence, i.e. "I love big numbers." Keeping the cards in sentence order, on the front of each one write a four to six digit number in ascending order from the beginning of the sentence to the end. Scramble the cards and let other students order the numbers. The activity is self checking because students can turn over the cards and see if the sentence is in the correct order.

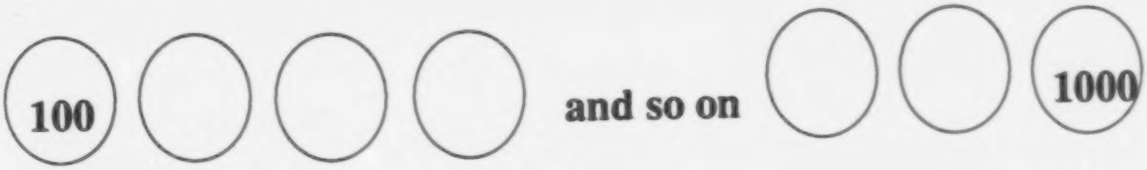
6405	**6450**	**6504**	**7039**	**7090**
N.C's	**bird**	**is**	**the**	**cardinal**

E. Have students find the prices of four similar products (8 oz. bags of cookies, 12 oz. pizzas, new tennis shoes, t-shirts, etc.). Write these on the board in random order and have students rewrite them in order from most expensive to least expensive.

F. Select important dates from North Carolina history. Have students order the dates from earliest to most recent and go on a scavenger hunt to find why the dates are considered special. Discuss the different ways to read numbers; for example, 1952 is read "nineteen fifty-two" as a date but "one thousand nine hundred fifty-two" in other situations.

Notes and textbook references

G. Each student draws a path of fifteen circles, placing the number 100 in the first circle and 1000 in the last circle. Partners take turns rolling 3 number cubes. Two cubes should be regular 1-6 dice and the third cube numbered 4 - 9. When the three cubes are rolled, the player decides which cube represents the ones, which represents the tens, and which represents the hundreds. The resulting number is placed in one circle on the path. Subsequent numbers must be placed in the path so that they remain in a series from least to greatest. The player who is able to fill in the last number wins. ***Problem solving through the game***: Does it matter who goes first? Are there some early strategies in deciding what numbers to form and where to place them that will help you win? ***Variation:*** Each player has his or her own set of 15 circles instead of the players using the same circles.



H. Play **Higher-Lower**: Within a group one student is the leader and decides on the number limit for the game: 0 - 100 or 0 - 1000 or 0 - 10,000 or 0 - 100,000 or 0 - 1,000,000. The leader writes a number within that range on a piece of paper, folds it, and places it out of sight. Group members take turns guessing the number. The leader repeats the number guessed and tells the group to go higher or lower. The player who guesses the correct number wins and becomes the new leader.

Math homework for journal writing. . .

1. *Interview your parent or another adult. Make a list of the mathematics they use in their jobs.*
2. *Watch the evening news. List all of the math-related things you see and hear about.*
3. *Before you leave school, estimate the number of doors you have in your house. When you go home, count them. Write a paragraph which begins "Estimating and the counting doors is an interesting assignment because. . ."*

1.4 In real world situations, discuss when it is appropriate to round numbers; round numbers to appropriate places.

Notes and textbook references

A. From the classified ad section of the local newspaper, use prices from real estate (houses) or automobiles to round numbers and make comparisons. Let students decide what place value you would round to in order to have a meaningful discussion.

B. Round off the population of your city and county. When would rounded numbers be appropriate to use and when would exact population figures be better?

C. Choose ten North Carolina counties whose populations when rounded to the nearest thousand would be between 10,000 and 20,000.

D. Discuss attendance at sporting events or concerts, average salaries, and areas of counties, etc., and decide why we usually see these as numbers which have been rounded. Would exact numbers ever be used related to any of these situations?

E. Provide students with a North Carolina map that shows mileage between cities. Have students plan a trip which goes to four or five cities. Have them add up the exact mileage for their trips. Next have students round the number of miles between cities and add their rounded numbers.

1.5 Use regions, sets, number lines and other concrete and pictorial models to represent fractions and mixed numbers; relate symbols to the model.

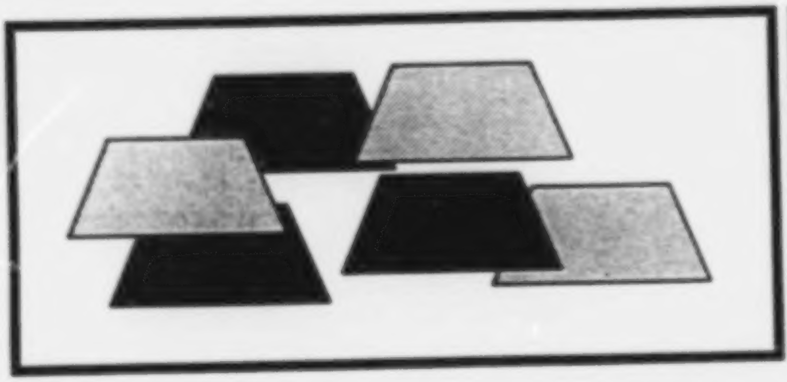
A. Cut out pictures from magazines which show groups and identify fractions that describe the pictures. For example, you have a picture of four girls standing in a group. One girl has pigtails, the others do not. The student may write 1/4 of the girls have pigtails; but 3/4 of the girls do not have pigtails.

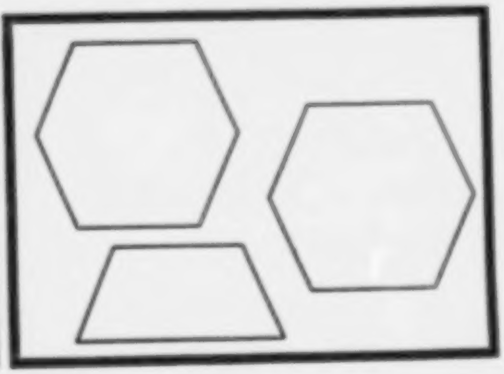
B. For students who need additional work with basic fraction concepts: Snap Unifix cubes together to model the concept of the whole divided into equal parts. For example, if the bar is 4 cubes, one unit would be 1/4 of the bar. But if the bar was made of 7 cubes, one unit would be called 1/7. Some fourth grade students need opportunities to confirm this basic idea. You might have them make sample bars of different lengths of one color of cubes. Change one cube per bar to a different color. Have the students' partners write the unit fractions being represented. Extend the activity to more than one cube being changed to another color (ex. 3/7).

Notes and textbook references

C. For a special treat with fractions you may wish to use a food lesson; schools have a variety of policies about this. Notice that you could bag cubes and complete the same lessons with non-food items. Provide each pair of students with a small bag of M&M's, Smarties, or other treats which come in small packages. Have the students open their bags, count the number of objects, and sort the candies by colors. The number of objects in the bag represents the whole (denominator). Ask students to write the fractional part of each color. For example, 5 yellows from a package of 15 candies would be represented as 5/15. Discuss the various ways you can talk about the whole bag of candy and its parts. Hopefully students will notice that all of the parts when put together add up to the whole. Formal addition of fractions is **not** the focus; relating symbols to the models is! When the lesson is completed, students may clean up by eating the candies.

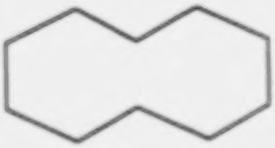
D. Use pattern blocks and have the yellow hexagon represent the whole. Explore what fraction is represented by the red trapezoid, the blue parallelogram, and the green triangle. Have students model and record by tracing around the blocks a variety of fractions such as 1/2, 4/6, 2/3, etc. Extend the lesson by creating situations in which the student will model improper fractions and use the pattern blocks to change them into mixed numbers. For example,

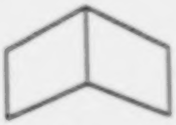




E. Using the hexagon as one whole, how many different ways can you represent (cover) the whole with pattern blocks? Have students experiment with the blocks and record in words and fraction notation: 4 green triangles with a blue parallelogram (4/6 and 1/3); one trapezoid with one blue parallelogram and one triangle (1/2 and 1/3 and 1/6). Notice that this activity will lead to a discussion of equivalent fractions.

F. Make a decagon outline by putting two hexagons together. Repeat the activity above but use your decagon as the unit (whole). Notice that you can make a 1/3 model by creating paper "arrowheads" by tracing two blue parallelograms.

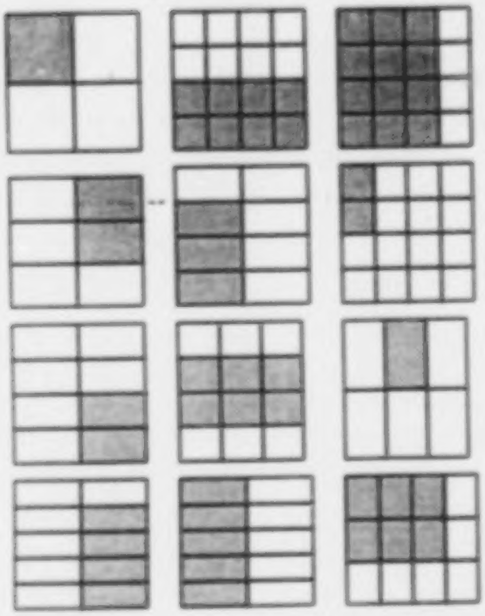




Notes and textbook references

G. Explorations as readiness for future tasks: Give groups of four students six rectangular paper "candy bars". As a group, they are to decide how they can equally share these candy bars, illustrate and write about their plan. Be certain to allow time for each group to report. Reinforce the ideas that you are interested in seeing how many different ways students can complete the task.

Fraction Tic-Tac-Toe



H. Play Fraction Tic-Tac-Toe. Use the blackline master for the overhead. Students will need to create their own gameboards by drawing a tic-tac-toe grid and writing any of the following fractions on their boards:

$$\frac{12}{16}, \frac{3}{4}, \frac{1}{4}, \frac{4}{8}, \frac{1}{2}, \frac{2}{6}, \frac{3}{8}, \frac{2}{12}, \frac{2}{8}, \frac{6}{12},$$

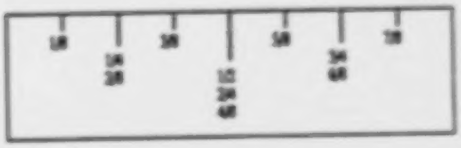
$$\frac{1}{6}, \frac{4}{10}, \frac{5}{10}, \frac{6}{12}, \frac{8}{16}, \frac{2}{16}, \text{ and } \frac{1}{3}.$$

As the leader uncovers the picture of a fraction on the overhead, students mark the fraction if it is on their gameboard. Three in a row wins. Since there may be several students choosing the same fractions, be prepared for several winners per round. Notice that this game is for both fraction recognition and equivalent fractions.

Check with a third grade teacher to review the fraction activities in the *__Strategies for Grade 3__* *book.*

I. Use class data to create a bulletin board "Our Class in Fractions". For example, 5/26 of our class has brown eyes; 14/26 are girls; 20/26 of us have pets; 19/26 of us can swim; 7/26 walk to school; 25/26 like pizza; 12/26 of us earn our allowance; 9/26 play a musical instrument; 4/26 watch less than 10 hours of TV a week; 15/26 watch Square One; etc. Have students illustrate the fractions.

J. Make a "Jolly Giant" ruler to give students experience with a numberline model for fractions. Each student needs a piece of paper that is about 4" wide and 12" long. After each student makes the "Jolly Giant" units, 4 to 6 students can fasten them together and make a measuring tape. Have each student



- Fold the strip in half, end to end. Draw a line on the fold and beneath it write 1/2 to indicate that the line represents 1/2 of the way from end to end.
- Fold the paper in half again and fold it a second time. Unfold and draw lines slightly shorter on these folds. Label them as 1/4, 2/4, and 3/4 to show that these lines are 1/4, 2/4, and 3/4 of the way from the beginning of the paper to the end.
- Refold the paper and then fold a third time. Trace the folds and label to show that these lines represent 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, and 7/8 of the way from end to end.

K. Write several fractions on the board (use fractions such as 4/5 or 3/4). Have students make up stories for each and share them with the class. Ask students to choose the stories they like best, elaborate (if necessary), and illustrate the stories to make a book about fractions to share with other classes.

1.6 Use models and pictures to compare fractions including equivalent fractions and mixed numbers; explain the comparison.

A. Play fraction card games. To make your deck, label and illustrate 13 index cards with the following fractions: 1/2, 1/3, 2/3, 1/4, 3/4, 1/5, 3/15, 4/15, 1/8, 5/8, 7/8, 1/10, 1/12. For each card make three more cards with equivalent fractions. Each of these should be illustrated. Example - 1/2 , 2/4, 3/6, and 4/8 would be one group. You should have 52 cards. Shuffle the deck.

- Pairs of students can play *concentration.* Deal all cards face down into four rows of 13. Players take turns turning over two cards at a time. If the fractions are equivalent, the student keeps the pair. The winner is the person with the most cards when all have been taken.
- Play *go fishing*. Deal five cards to each player. Stack the remainder face down in middle of table. The object is to get books of two equivalent fractions. At each turn players may ask others in the group for a certain fraction. As long as someone gives the person a card, the player may keep asking. When no one has an equivalent fraction to give the player, the person "goes fishing" by drawing from the deck. At the end of the game, the player with the most books wins.
- Adapt other card games to your equivalent fraction deck.

B. Integrate measurement studies with fractions by having each student create a fraction bar set. On the paper cutter cut 28 strips that are 1" x 6" for every student . (Use 9" x 12" or 12" x18" construction paper to make the task easier.) Each student will need a sandwich bag to store the set. Have students measure and shade their fraction bars as follows. Allow them to color the bars as they choose, since a bar with 1/3 shaded remains the same fraction whether it is colored red or green.

- one unit bar (no divisions)
- three bars divided into thirds (2") (shade one bar entirely; 1/3; 2/3)
- six bars divided into sixths (1") (shade one entirely; 1/6; 2/6; 3/6; 4/6; 5/6)
- two bars divided into 2 parts (3") (shade one bar entirely; 1/2 of other)
- four bars divided into fourths (1 and 1/2") (shade one entirely; 1/4; 2/4; 3/4)
- twelve bars divided into twelfths (1/2") (shade one entirely; 1/12; 2/12; etc.)

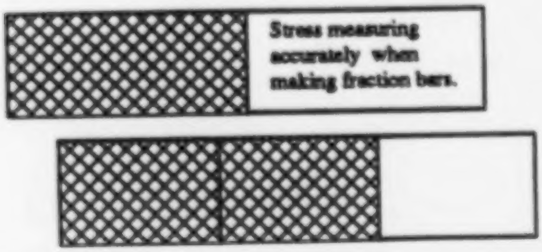
Students should write their names on the backs of each fraction bar so that the sets may be used together in activities.

- With a partner mix two sets of fraction bars together. Place them face down. Each student draws a bar and they compare to determine the greater fraction. They must record their comparison (1/3 >1/4). The person with the larger fraction shaded keeps both bars. If the fractions are equivalent, each student keeps a bar for that turn. Continue until all bars in the original mix have been compared.

Investing time in activities such as this is critical and will pay benefits in student understandings in subsequent grades. There is great value in having students create their own manipulatives, use them in activities and relate the symbols to their models.

Notes and textbook references

• Students work in pairs to determine all possible groups of equivalent fractions in one set. Arrange bars together and record this information in symbolic form. (1/3 = 2/6 = 4/12 or 3/3 = 1 = 2/2 = 4/4 = 6/6 = 12/12)



Stress measuring accurately when making fraction bars.

• Working in pairs, have students find three bars which are not equivalent. Order the bars from greatest to least then least to greatest and use the appropriate symbols to record each set. (11/12 > 1/2 > 1/4 and 1/4 < 1/2 < 11/12)

• Have the students trace the bar that is divided into halves. Shade 1/2. Now divide each half into two equal parts. Did the shaded area increase or decrease? (no) What part is shaded? (2/4) Now divide each part into half again. What part is shaded? (4/8) Divide each part again into equal parts. What is shaded? (8/16) Can you predict what fraction you would be illustrating if you divide each of these parts into two equal parts? Repeat the activity with bars that are divided into thirds.

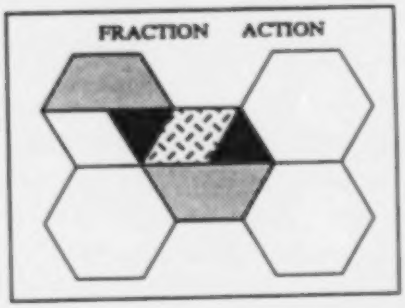
Understanding equivalent fractions is fundamental to success with fraction operations. Students need many opportunities to find equivalencies and to record fraction relationships with models to give meaning to the symbols.

C. Play **Paper Bag Fraction Bar Games** using commercial fraction bars or ones students have made. Directions for the games are included on a page at the end of this section.

D. Play the pattern block equivalent fraction game **Fraction Action** (gameboard is at the end of this section). Students may play in groups of 2, 3, or 4. Each group of students will need blue parallelograms, trapezoids, triangles and hexagons from the pattern blocks, a gameboard for each student and a set of "draw cards" labeled 1/2, 2/2, 1/3, 2/3, 3/3, 1/6, 2/6, 3/6, 4/6, 5/6, 6/6, and 1. These cards are shuffled frequently during the game and are always used in one draw pile, fractions facing down. The purpose of the game is to be the first to cover your gameboard with yellow hexagons. Before beginning the game, be certain that students recognize the relationship of each pattern block piece to the hexagon which will be considered the unit (one whole). To play, take turns drawing a card. Students collect the blocks named by the fractions and place them on their boards. For example, if you draw 3/6, you would play 3 green triangles. At each turn students trade if possible to keep the fewest number of blocks possible on their gameboards.

If my gameboard looked like the example at the right, I could trade the two trapezoids for a hexagon. The two triangles could be traded for another parallelogram or I could trade the parallelogram and one triangle for a trapezoid. In playing the game, however, my gameboard would never look like this because I should trade equivalent fractions as soon as possible. For the game to focus on equivalent fractions, have students describe their transactions.

"I will trade my 1/3 and my 1/6 pieces for the trapezoid which is 1/2 of the hexagon because they cover the same area."



1.7 Use models and pictures to demonstrate the value of decimal numbers with tenths and hundredths. Show decimals as an extension of the base 10.

A. Use the base 10 blocks to model numbers such as 251 or 372. Suggest that you would like to try substituting a cube of cheese for one centimeter block used to model the ones (units). Model other numbers such as 586 or 144 with the cheese. Tell students that you are planning to cut one of the little cubes into 10 parts. (Do this on a sheet of clear plastic on the overhead so everyone can see or in small groups. Try to get the 10 pieces as equal as possible.) Do you still have 144? (Yes) Give 4 students a tiny piece. Now you have 143 and 6/10. Show students that this number can be represented in a variety of ways:

- with words (two hundred forty-three and six-tenths)
- with blocks
- as a mixed number (143 and 6/10)
- as a decimal number - 143.6

Use the base 10 blocks and the tiny tenth pieces to model other numbers, having students write on their papers (while one student writes on the board) the names of these numbers in words, as mixed numbers, and as decimal numbers.

Give each group of students wax paper to work on, a table knife (plastic), and enough cubes of cheese for each group to have 4. Have students cut one cube into ten pieces. The fact that they are small may help students remember that tenths are parts of one. Ask students to take turns being the leader and naming numbers to model (2.3, 1.7, 3.5, etc.). Students should model the numbers and write them in words, as mixed numbers, and in decimal form.

When you are ready to end the lesson using the cubes of cheese, give the entire group these directions to "dispose" of the manipulatives. Keep in mind the primary purpose is to model decimal numbers and relate the models to the manner in which they are recorded.

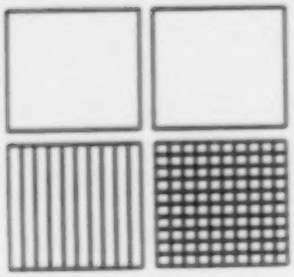
- Show me 1.2 cubes of cheese. Remove these. What do you have left? (2.8)
- Show me 1 cube. In a different place show me .4 of a cube. Which is more (greater), 1 or .4? Remove .4. What is left? (2.4)
- Remove 2. What is left? (.4) Write on your paper the symbols which tell how many cubes are left. (You may wish to show students that some people would write . 4 while others would write 0.4. Ask students to explain why both could be correct notation.)

B. Use paper models for units and tenths on the overhead (see blackline master) and allow students to model and record numbers such as 3.2, 4.7, and 1.8. When students are comfortable with the model, tell them you are going to cut one of the tenth models into ten parts. How would you write this? (.10) What would you have if you cut all 10 tenths into 10 pieces each? (100 hundredths). Use your unit, your tenths, and the hundredths pieces to model numbers like 1.14 and 2.07. Recording what you have modeled in three ways will help students relate the new decimal recording system with more familiar words and fraction notations.

Notes and textbook references

No matter how good our explanations, many students are surprised to find that $.57 + .43 = 1$. Somehow, the activities fall short of helping some students grasp the extension of our place value system to tenths, hundredths, and thousandths. They want to say .2 is less than .13 "because 13 is bigger than 2."

We searched for objects that could be used with our base 10 materials to model units. Neither tiny marshmallows nor cubes of cheese worked very well – it is hard to cut them into 10 equal tiny pieces. But perhaps these activities will help with decimal place value at the most concrete level.



Give each student a paper model for 2 units, tenths, and hundredths and a sandwich bag to store the models. Have students cut apart the tenths and the hundredths. Have them practice modeling numbers and recording them in three ways. You might have students work at their desks and different ones take turns working at the overhead and writing on the board. Toward the end of the lesson, give students four decimal numbers for them to make with their models; draw a picture of the models on their paper; and record in three ways (in words, as a mixed number or fraction, and in decimal form).

Notes and textbook references

While students work, you will be able to move around the room and informally assess individuals' understandings of decimal numbers.

C. Have students make many other models for tenths. For example, in South America egg cartons come with places for 10 eggs. Students could cut special models. Students could make additional fraction bars for tenths (they may need help in dividing the bars into 10 parts). Have students look for things which come in tens and create a bulletin board showing the models and three ways to record each.

D. Allow students to work in groups to create a decimal model set using the blackline masters at the back of this section. You may wish to duplicate the decimal models on card stock. A complete set will have 33 cards. There will be 1 unit, 11 cards colored as tenths, and 21 cards colored as hundredths. Each group may wish to identify their set by putting a design on the back of their cards. Students should use light colors of crayons, markers, or coloring pencils so that the divisions will show. Color the following:

0 tenths (.0)
2 tenths (.2) etc.
10 tenths (1.0)
5 hundredths (.05)
15 hundredths (.15) etc.
95 hundredths (.95)

a unit (1)
1 tenth (.1)
9 tenths (.9)
0 hundredths (.00)
10 hundredths (.10)
90 hundredths (.90)
100 hundredths (1.00)

For the Math journal... How do you know that 0.6 is greater than 0.06?

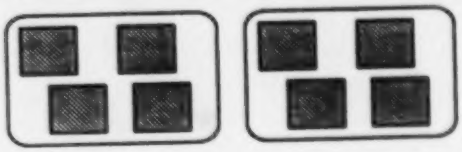
E. Make cards with decimal numbers to match the pictures created in Activity D and use the decimal models to play games similar to those with fraction bars: concentration and a modified bingo are both good ways to become familiar with decimal numbers.

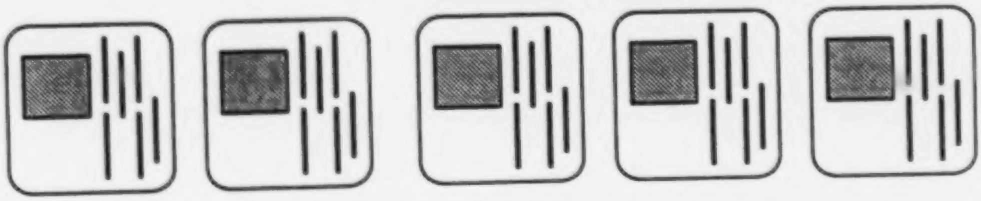
F. Have students write about decimals to give you information about their understandings and to give them practice expressing mathematical ideas in narrative form. Answer a single question frequently rather than have long writing assignments. "Explain what a decimal number is." "Why would you prefer to have 2 candy bars rather than .8 candy bars?" "What does .4 mean?"

G. Use decimal models (activity B) and calculators to discuss what it means when the remainder in a division problem is shown as a decimal instead of a whole number. For example, model and use the calculator to solve 8 ÷ 2 = 4. The 8 squares are easily shared equally in two sets. Now show 8 ÷ 5 = 1 remainder 3 or 1.6. In this latter example, one square goes in each set but the remaining three

Notes and textbook references

squares are cut into 10 tenths for a total of 30 tenths. These 30 tenths are shared equally in the five sets. The calculator does this (divides the remainders into tenths and shares them equally) automatically. If you have access to Explorer calculators, students can see the remainders displayed as whole numbers or as decimals.





H. Students, working in groups, use one set of decimal models that were previously made to play an inequality activity called "WAR". The models are equally dealt out to the players (extras go in a discard pile). Each player's stack is face down. Students simultaneously turn over the model on the top of their stack. Comparing the face-up models, the player that has a greater amount shaded takes the other models. If there is a tie on the shaded amount then those students spell the letters in WAR as they turn over a model for each letter. Whoever has the greatest shaded amount wins all the models face-up. Play continues until one player has all the models.

I. Extend the "WAR" game by adding cards with the decimal numbers which match the models written on them. Shuffle these with one deck of picture cards. Follow the same rules for playing.

J. Students, working in groups, use one set of decimal models and decimal number cards that were previously made to play an equality game called "TURN OVER." Each player receives 6 decimal models to place face-up in two rows. The cards are shuffled and placed in a stack face-down where all players can reach. A player turns over the first card and shows it to the entire group. Anyone who has a decimal model that is equivalent to the card turns over their model. For example, if the card ten hundredths is drawn off the stack then the decimal models for 1 tenth and 10 hundredths could be turned over. Players take turns drawing cards off the stack. The first player that turns over their 6 decimal models wins the game.

> *Do you use integrated units in your classroom? Evaluate the mathematics in your existing units using the integrated unit planning guide in the blackline masters section. Use it to put together new materials also.*

1.8 Use models and pictures to compare decimals (wholes, tenths, hundredths) which relate to real world situations; record and read results.

Notes and textbook references

Since North Carolina has 100 counties, using the counties is an ideal way to model decimal numbers less than one. Always relate the examples to parts of the total 100 counties.

A. When students color a North Carolina map to show which counties lie within the 3 (or 4 depending upon what text is used) main regions of North Carolina, have them count the number of counties in each region and write the appropriate decimal. For example, **41 out of 100 counties are in the Coastal Plain region. Another way to say this is .41 of the counties in North Carolina are in the Coastal Plain.** A more concrete version of this activity would have students begin with a hundreds board and three different colors of cubes. Groups determine a color of cubes for each region. Every county within a specific region will be represented by the same color. Place cubes on the hundreds board to represent the counties. For each region count the cubes of each color to tell how many parts of the entire hundreds board was covered by that color. Write the decimal number. Students could then color the map and write the appropriate decimal numbers for each region.

B. Students, working together, find out what letters of the alphabet are most frequently used as the beginning letters of the 100 counties' names in North Carolina. Have them decide as a group how they will record their data as they tabulate the number of counties for each letter. Encourage each group to create some type of display and to write the decimals (and fractions) to represent the frequency of letters used in the counties' names.

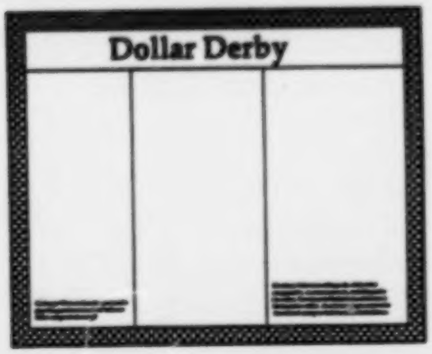
C. Reinforce the idea of parts of a whole throughout the year by asking different questions about North Carolina counties and expressing the answers as both decimal numbers and fractions with 100 as a denominator. For example, you might have students to do research and determine what part of North Carolina's counties...

Ask the librarian to talk with the class about how the Dewey Decimal System works.

- have populations of less than 50,000.
- border the Atlantic Ocean. (or border Virginia...)
- have a county seat. (all of them or 100/100 or 1.00)
- have state parks.

D. Use pennies, dimes, and dollars to illustrate decimal numbers. Since students are familiar with 10 dimes to make 1 dollar, dimes are a good model for .3 or .6 etc. They also know that 100 pennies make 1 dollar. Model that .15 hundredths might be shown as 15 pennies (i.e. 15 parts out of the 100 parts -pennies - needed to make 1 dollar) or 1 dime and 5 pennies.

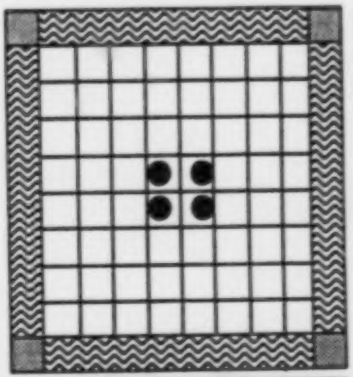
E. Play **Dollar Derby**. The object of the game is to be the first to win a dollar. For each group of 3 to 4 students you need a gameboard each (see blackline masters), one regular die, and play money (pennies, dimes, and one dollar). Notice that the game could be modified to become a subtraction with regrouping game.

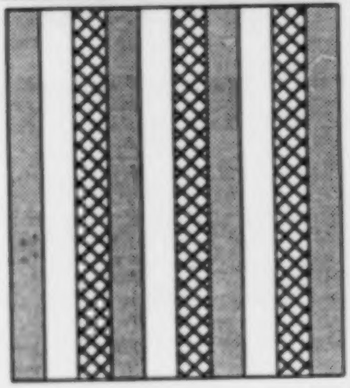


1.9 Use models and pictures to establish the relationship between whole numbers, decimals and fractions; describe using appropriate language.

Notes and textbook references

A. Give each student a copy of the blackline master that has six grids (one with the unit divided into 10 parts and five with a hundred parts).On the first grid ask students to color a stripe pattern using only two colors. Stripes may be narrow or wide. (Use the back of the hundred board and Unifix cubes for a concrete experience.) Write the decimal and fraction which shows how much of the total is covered by each color. Ask students what they might write if they were to divide the unit into 10 parts horizontally as well as vertically Directions for the other grids might include...





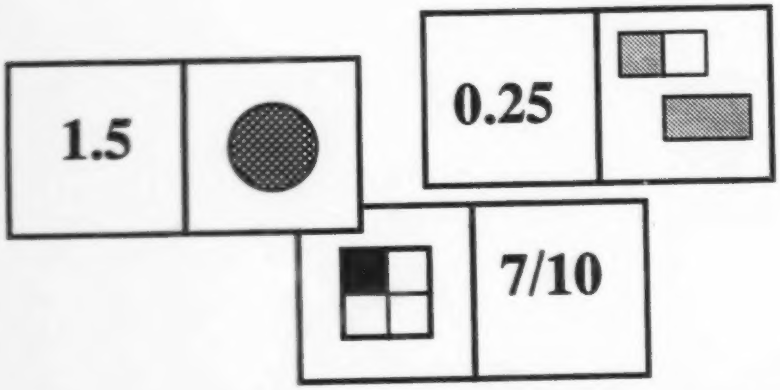
- Color your initials. Write the decimal and the fraction to show what part of the unit is your first initial, your last initial, the total uncolored, the total colored. What do you notice about the totals together?
- Color a pattern that might have been used by North Carolina native Americans. Tell about each color you have used by writing the decimals and fractions.
- Color a symmetrical design. Write the fraction and decimal numbers which tell about each color.
- Suppose you asked 10 people to name a single digit number. What do you think that would be? Make a design with that number in the center and some decoration in the corners. Write the decimals and fractions to tell about the colors you used. Make a graphic display to show everyone's numbers.
- Make a picture of a North Carolina product inside a frame. Write the appropriate decimals and fractions to tell how much of the total grid is not colored, how much is the frame and how much is the product.
- Make a design that is .28 red, .14 blue, and .30 yellow. How much of the total is not colored? Write the answer in three ways-words, decimal, fraction.
- Make a design in which .60 is colored and .40 is not colored. How much of the total is each color you used?

Notes and textbook references

B. Using a hundreds board and colored cubes, cover all multiples of 3. What part of the total grid is covered? Write your answer as ______ out of 100 parts, in words, as a decimal number, and as a fraction. Repeat the activity with multiples of 4, multiples of 6, multiples of 7, and multiples of 8. Notice the patterns made by the cubes. How can this pattern help you predict multiples beyond 100?

C. Make a display of sets of ten (10 people, 10 animals, 10 N.C. products). Within the set find two or more classifications (4 children and 6 adults). Write the subsets in words, decimals, and fractions. (Four-tenths are children. In this group .4 are children. When we classified the people, 4/10 are children.)

D. Have students work in groups to make fraction/decimal dominoes. One end of the domino would have a picture, the other end would have the fraction or decimal notation. An important part of the task is to figure out what they will make. Allow students to sketch the total set in miniature before making the finished dominoes on heavy paper (old file folders, for example). Let them decide if every set must have the same dominoes, what would constitute a set, how many matches they want, etc.



In the teachers' editions of the new mathematics textbooks adopted by North Carolina there are many activities and lessons for developing numeration concepts and "number sense." Suggestions for writing activities and focusing on connections between manipulatives and the symbols used to record ideas are included. If we teach what we say we value, it is imperative that the time spent for drill and practice for developing computational expertise and the time invested in explorations and application activities be well balanced.

The learner will demonstrate an understanding and use properties and relationships of geometry.

2

2.1 Use manipulatives, pictorial representations, and appropriate geometric vocabulary (e.g., sides, angles, and vertices) to identify properties of polygons and other two-dimensional figures.

Notes and textbook references

A. Make a shape on the geoboard. Have your partner try to construct a figure congruent to it, looking at the figure. Count the sides, angles and vertices to see that the shape is the same.

B. *Step 1:* Use pictorial representations of North Carolina native American villages and identify polyhedra and other figures. *Step 2:* Use pictorial representations of American buildings from the 1700's and the 1800's and identify properties of polyhedra and other three-dimensional figures. *Step 3:* Compare similarities and differences.

C. Divide the class into groups and assign each group a polygon. Allow 15 minutes for each group to find as many objects as possible within the classroom or on the playground, etc., which are examples of that figure (i.e., rectangle-book, chalkboard, etc.) Have a spokesperson for each group stand up and state each example and why, utilizing the correct vocabulary.

D. Have students create their own tangrams. Use this paper folding activity to build vocabulary, make comparisons, and informally access students' understandings.

Read Grandfather Tang's Story by Ann Tompert to begin students' explorations of tangrams.

E. Utilize individual sets of tangrams. Have students take each piece (seven in all) and label the polygons. There are triangles, a square, and a parallelogram). They should identify the distinguishing characteristics of each piece. In small groups or with a partner, have students make and record the ways they use these polygons to create other shapes. See Tangram Patterns.

Notes and textbook references

F. Discuss properties of polygons using pattern blocks and geoboards to create examples (number of sides and vertices, angles). Complete a chart such as this, with students helping to label columns.

Shape	Number of sides	All right angles	Sides equal length
PARALLELOGRAM	4	SOMETIMES	OPPOSITES
SQUARE	4	YES	YES
HEXAGONS	6	NO	SOMETIMES

G. Using pattern blocks and the gameboard "Apple-licious" (see blackline masters), have students play several times. After playing, have students discuss the strategies they used. Then incorporate the following ideas in their journals:

- Describe your apple by identifying how many three-sided, four-sided, or six-sided figures you used.
- Estimate (separately) the total number of angles . . . vertices . . . sides . . . that are in the design. Then, count to see how close your estimation was.

H. After listening to Shel Silverstein's poem, "Shapes" from A Light In The Attic, let students cut out those shapes. (Use this as a listening activity. Do not re-read the poem until you give students the opportunity to construct shapes.)

I. On a chart, display road signs. Then have students identify the figures they see and tell how they identified the signs. (Use geometric vocabulary to identify properties of the figures.)

J. Using a geoboard and number cubes, the student rolls the number cube to determine how many sides his figure will have. Then on the geoboard, the student must construct the shape. Student must give at least two facts about his/her figure, i.e., "It is five-sided, so it is called a pentagon." or "It is a closed figure with five angles." Students who roll a "1" or a "2" may roll again.

K. Give students a geoboard and assign the problem of creating a shape that meets these three criteria:

1. Uses only one rubberband.
2. No crossovers with the rubberband.
3. Must have area (space) within.

Before sorting the shapes by attributes, have the students verbalize what the similarities are of all the shapes created. All the shapes are polygons. Have all the students who have polygons with 3 sides go to the front of the room and display their shapes. Have the students tell the similarities and differences of the triangles created. Discuss number of sides, types of angles, the name of the shape, etc. Students come to the front of the room with their polygons based on the number of sides continue discussing similarities and differences.

Notes and textbook references

M. Use geoboards for students to try these tasks:

- Make a 3-sided polygon with all sides different lengths.
- Make an 8-sided polygon that is not a stop sign.
- Make a 5-sided polygon that has at least two right angles.
- Make a polygon that has opposite sides parallel.
- Make a 3-sided polygon that has a right angle and two acute angles.
- Make a 6-sided polygon that has at least one obtuse angle.
- Make a 4-sided polygon that has no right angles.
- Make a polygon that has both vertical and horizontal symmetry.
- Make a polygon that looks the same no matter how the geoboard is turned - no fair using a square.
- ***Challenge*** - What is the maximum number of sides a polygon could have on a geoboard? Try sketching the polygon or using more than one rubberband to find out!

2.2 Use manipulatives and appropriate geometric vocabulary (e.g., edges, faces, and vertices) to identify properties of polyhedra and other three-dimensional figures.

A. What kind of Geo-pane can be made with a 3-D shape? Build a 3-D shape with toothpicks and 1 cm clay balls. These may include a cube, pyramid, or rectangular prism. Hang each shape from a thread and dip completely into a water and soap mixture. Lift out and observe edges, faces, and vertices. (A recipe for a soap mixture is located in goal 2.2 Activity I.)

B. After talking about space figure models, ask students to choose one and to find as many examples as possible in their homes. Record to share with the class.

C. Play the "Who Am I" game on the bulletin board. Display a list of statements such as: "I Am That Everywhere", "I Have Four Vertices", etc.. In responding, students will notice that there may be more than one correct response and that each clue limits the range of responses. Direct the students to make up their own strips to be displayed on the board or exchanged with other students.

D. Play Twenty Questions with students trying to guess a mystery 3-D shape hidden in a bag or box. Questions should require a "yes" or "no" answer and should identify some property of a polyhedra (size or number of faces, vertices, edges).

E. With a partner, construct a cube, square-based pyramid, tetrahedron, and cone(see blackline masters). Then complete a table similar to the example.

	Edges	**Faces**	**Vertices**
Cube			
Square-based pyramid			
Tetrahedron			
Cone			

Journal: Students will compare similarities and differences between any two of the four figures (use table for information).

Variations: When constructing the figures, have students write down some properties of the figure on the faces. Before assembly, use the constructed figures as mobiles.

F. Utilizing magazines, catalogs, and old books, have students bring in pictures of objects that are examples of geometric solids, i.e., pictures of baseballs, buildings, etc. Then, create a bulletin board by categorizing the pictures.

CUBE	TRIANGULAR PRISM	SPHERE	CONE	SQUARE BASE PYRAMID
☒	☒ ☒	☒	☒	☒

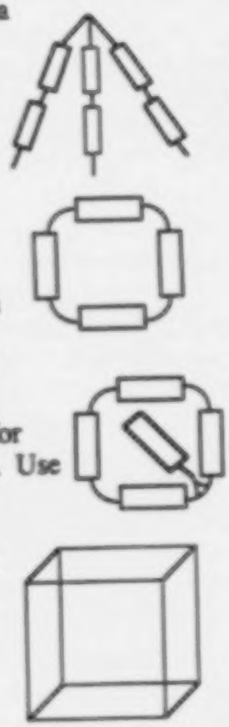
G. Place objects that represent various solids (marbles, tissue roll, tissue box, dice, can of soup, box of cereal in a bag). Then, have individuals select one object from the bag. As each item is displayed, the class must write down the shape (cone, cylinder, etc.) and list the object's properties (number of edges, faces, vertices).

H. See the **Geo-Cordo card** and the accompanying activities in the *Grade 3 Strategies for Instruction in Mathematics.*

I. Soap Bubble Math: have students create polyhedra such as a tetrahedra from straws and pipe cleaners. To make a tetrahedra, cut six one-quarter sized sections of regular straws (2 1/2" or 3" lengths) and three pipe cleaners. Twist three pipe cleaners together at the top for about 1". Slip two straw sections onto each pipe cleaner. Bend each pipe cleaner sharply in between each straw section. Attach one bottom end of each pipe cleaner to the middle of the next pipe cleaner (between each straw section.) Attach one bottom end of each pipe cleaner to the middle of the next pipe cleaner (between two straw sections). Work all the way around.

To make a cube, cut twelve one-quarter sized sections of regular straws (2 1/2" or 3") and four pipe cleaners. Make two separate squares using four straw sections and one pipe cleaner for each square. Then cut your remaining two pipe cleaners in half. Use one piece of pipe cleaner and one section of straw to join the two squares at each corner.

Dip these polyhedra into the following soap mixture and observe the edges, faces and vertices created by the soap film. Have the students observe and record what happens when the soap film meets in the interior of the polyhedra.



Soap Bubble Solution:

1 cup dishwashing liquid soap (Joy is the best)
1 gallon water
1 tablespoon of glycerine (makes stronger bubbles)

Add soap and glycerine to cold water and mix gently trying to prevent suds from forming. Age for five days for best results.

2.3 Explore turns, flips, and slides with figures.

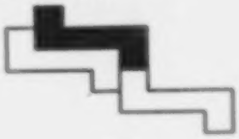
Notes and textbook references

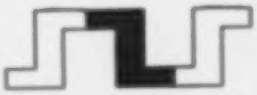
A. Trace the basic shape of your county from a North Carolina map. Predict how that figure will look after you flip, slide, or turn it different amounts. Experiment, trace, and label the transformation.

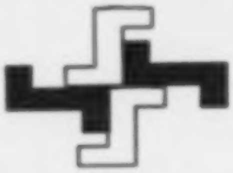
B. Use a non-regular geometric shape to create a picture incorporating turns, flips, and slides.

C. Give each student a set of tangram pieces and several tangram puzzle sheets for practice in turning, flipping and sliding the seven pieces to fit inside the form.

D. Let students cut out a cardboard pattern of an interesting figure. Make a design by tracing around the design and then do a flip, slide or turn. Trace again. Repeat until a design is made.







E. Explore which of the six pattern block pieces can be used to clearly demonstrate a flip, a turn, and a slide. If a figure looks the same after the transformation, we would not consider it a good model. Record findings on a chart:

	FLIP	TURN	SLIDE
Hexagon			
Trapezoid			
Square			
Triangle			
Blue parallelogram			
Tan parallelogram			

In their journals, have students summarize which pattern block pieces can be used to demonstrate all three transformations. . . only two. . . only one. . . none at all.

F. Place a trapezoid on the overhead for all to see. Have students take turns at the overhead, rolling a number cube. Turn off the overhead or block the view. If the number cube lands on a 1 or 2, the student will turn the trapezoid. If the number cubes lands on a 3 or 4, the student will flip the trapezoid. If the number cube lands on a 5 or 6, the student will slide the trapezoid. Turn the overhead back on. If a person from the opposite team can describe the activity, one point is awarded for the correct answer. (Can be played as teams or individuals.)

G. Using a 1 x 2 gameboard (see blackline masters), place a trapezoid in each square. Player A will either flip, turn, or slide the trapezoid in the first square. Player B must describe the transformation that occurred. The player B will flip, turn, or slide trapezoid in second square and player A must identify transformation. (Points awarded for correct answers.)

Notes and textbook references

H. Using the geoboard, player A constructs a geometric figure. Player B will choose a card from a deck of index cards (labeled with either the word flip, turn, or slide). Whatever the card has written on it, player B must reconstruct player A's shape to match the direction on the card chosen. Player B scores if the new figure is correct. The player with the most points after six rounds wins.

I. Using the orange squares from the pattern blocks, one-inch ceramic tiles or one-inch paper squares, students work in groups to discover what are polyominoes and their possible arrangements. Starting with two squares, how many ways can those two be arranged so that they follow the rule that squares must share at least one side with another square. There is only one way and it is called a domino. If a shape can be turned or flipped or slid so that they look alike they are considered the same. Students take three squares and see how many arrangements are possible following the rule that squares share at least one side with another square. (There are five possible triominoes.) There are five possible solutions to a four-square puzzle. They are called tetrominoes. Continue on with five squares and all the possible solutions. These are pentominoes. Continue on with six squares. These are called hexominoes.

J. Students, working together, use the hexagons (yellow), trapezoids (red), blue parallelograms and triangles of the pattern blocks to find all the different ways to cover "Pattern Block Triangles." Students cover the triangles with the blocks. As a triangle is covered, the students color to record that solution. Students cut out the colored solution. This makes it easier to compare with another triangle solution since they will probably find solutions that are flips or turns or slides of triangles they have already done.

2.4 Make models of line segments and their midpoints, intersecting lines, parallel lines, and perpendicular lines, using materials such as geoboards, paper-folding, straws, and computer graphics.

A. Use dot paper , rulers and colored pencils. Draw line designs. Then label the line segments. Tell which line segments are parallel, and which are perpendicular.

B. With a straight edge on plain paper, have each student draw a series of random straight lines covering much of the page. The paper should contain at least one set of each of: parallel, perpendicular, and intersecting lines. When complete, have students pair up, find, and color code the parallel lines, perpendicular lines, and intersecting lines on each other's paper.

C. Make parallel lines on geoboards that are horizontal, vertical and diagonal. Discover the polygons that can be formed with parallel lines.

D. Explore how many sets of perpendicular fold lines can be formed by continuing to fold a piece of paper into halves over and over. Is there a pattern?

Notes and textbook references

E. Using Logo or a computer disk that creates graphics, students create a design that contains line segments, midpoints, intersecting lines, parallel lines, and perpendicular lines.

F. Divide class into pairs. Each pair is given a bundle of 12 toothpicks. Player A releases the bundle onto a flat surface. Then player A identifies any parallel lines, perpendicular lines, line segments, or intersecting lines. One point is awarded for each item identified. Then player B collects the toothpicks and proceeds in the same manner as player A. Player with the most points after five rounds wins.

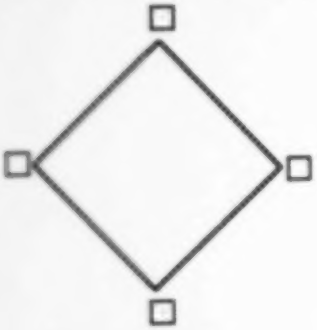
G. Use the "Decoding Student Names" sheet at the back of this section. Notice that the task is complex enough to be used as a partner activity.

Variation: Instead of using student names, use words such as lighthouse, apples, tobacco, Raleigh, mountains, coast, Piedmont. . .

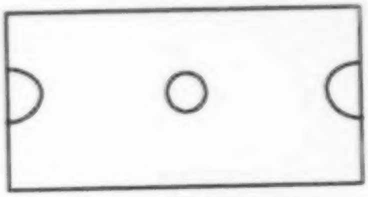
H. Make full-page copies of the North Carolina flag. Have students color the flag. Then glue straws over all line segments. Identify any parallel, intersecting, or perpendicular lines. (Makes a good bulletin board display).

I. Students use tagboard or construction paper and cut out - hexagons, triangles, trapezoids, squares, and parallelograms. Then create a "Shape Man" by gluing the pieces together. Construct mobiles or hallway display. (Students identify types of lines displayed.)

J. Have students research the playing fields or courts of sports, such as baseball, football, and basketball. Make a list of any geometric shapes in the design of the playing field or court. Then divide the class into groups. Students use masking tape and design the areas for a display featuring the geometric shapes. Examples:



Baseball field



Basketball Court

K. **UP, UP, AND AWAY!!** Create a paper airplane. One pattern is found on page 105 in Complete Writing Lessons for Middle Grades by Marjorie Frank. As the student progresses through each step, he/she must identify any parallel, intersecting, or perpendicular lines.

2.5 Use a variety of models to illustrate acute, right, and obtuse angles.

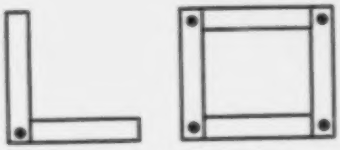
Notes and textbook references

A. On a geoboard, make triangles which illustrate acute, obtuse and right angles. Can you make a triangle that has an obtuse, an acute and a right angle in the same figure? Why or why not?

B. Give each student a magazine picture depicting life in North Carolina. Have each student trace acute angles with red, trace obtuse angles with blue, and trace right angles with green.

Allow students to make georule sets cut from old file folders or other stiff paper. Cut 2" x 6", 2" x 8", and 2" x 12" pieces. Punch holes in each end of the pieces.

C. Make a georule by connecting two strips of stiff paper 2" x 12" with a paper fastener. Use it to make different angles. Connect more pieces to make polygons.



D. Have students use their elbow and arms to illustrate angles. Have students model with their bodies right, obtuse, and acute angles.

E. Construct a model of the Cape Lookout Lighthouse. Then have students identify any right, acute, or obtuse angles.

F. Use two coffee stirrers and a twist tie to make a flexible angle maker.

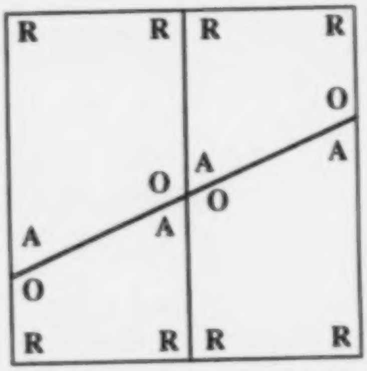
G. Write the words "North Carolina" in all capital letters. Make copies and distribute to the class. Students use a red crayon to shade in right angles; blue to shade in obtuse angles; yellow to shade in acute angles.

NORTH

CAROLINA

H. Use the corner of a piece of newspaper as a "right" angle tester." Start a class list of right angles found in the room.

I. Draw two lines on a piece of paper. Make the lines connect the opposite edges. Lightly shade the front of the paper. Cut along these lines and then label each angle: A = acute, O = obtuse, R = right. Put the puzzle pieces back into a rectangle. Do you notice any patterns?



2.6 *Relate concrete models of lines and angles to pictorial representations and to examples in the environment.*

Notes and textbook references

A. Use toy houses or small cardboard food boxes to set up a village. Draw a picture of this with a city park, houses, mall, etc. that includes parallel, perpendicular and intersecting lines as well as acute, right and obtuse angles.

B. Use recycled boxes, cartons, hose containers, etc., to build a model of a futuristic community. Draw a map of the model focusing on the two dimensional shapes and angles required to symbolize the solids.

Use a related writing prompt, "Life In the Year 2000."

C. Use a door swinging on a hinge to model angles. Put masking tape on the floor to mark where the door is when closed. Open the door different distances and mark the other rays with tape.

D. Use clay and toothpicks to create the following shapes: square, triangles, octagon. What road signs are shaped in a square, triangle, or octagon?

E. ***Step 1:*** Construct an Indian loghouse. Explain what shape the house is (use geometric terms). ***Step 2:*** Research and construct the type of home built in the back country (before the 1700's) by the people of the Coastal Plain. What shape was the roof - flat or sloped? Why was it constructed in this way?

F. As a class, create a model of the main streets in your city or town. Then draw a map showing the intersections. ***Variation:*** Build a model of your school building and property.

G. Research the Wright Brothers' first flying machine, the glider. Create a replica of the glider. Identify geometric terms or properties as related to the glider. (Explain why Kitty Hawk was chosen as a good location for the flight.)

H. Fences were often built on the farming land of the Piedmont. In groups of four, have students build a fence (use toothpicks and clay or florist styrofoam). Emphasis should be placed on lines and angles. (Explain why fences were needed during the 1700's when settlers were "staking their claims.")

I. Give groups of students identical sets of tinker toys. Include circles, sticks, and plastic/paper pieces. Allow them to label the wheels (points) with circle dots and markers or masking tape. The task is to build something and then list as many geometric ideas that are modeled.

MATH CLASS PROJECT. . .

Make a math glossary. Using a loose leaf notebook and divider pages cut from old file folders, have students create an illustrated glossary of math vocabulary. Keep it handy for student and for them to insert additions.

Create a company to provide a new North Carolina product. In groups, have students plan the organization of the company, the design of the product, the advertising campaign, and the details of manufacturing. Let each group report to the others.

ANOTHER TEACHER RESOURCE:

MEASURING UP

National Academy Press
2101 Constitution Avenue, N.W.
P. O. Box 285
Washington, D. C. 20055

202-334-3313 or 1-800-624-6242

The learner will demonstrate an understanding of patterns and relationships. 3

3.1 Identify and describe mathematical patterns and relationships that occur in the real world.

Notes and textbook references

A. Using a hundreds board, identify a starting point (i.e., 47). Use arrows to indicate movement on board. Have students determine where they end up. Look for patterns in movements. Try several and then allow the students to create their own problems. Before making the movements, have students predict where the marker will land by looking at the arrow pattern.

47 ← ↑ ↑ ↑

21 →→↓→↑

B. Explore number patterns on the blank side of a hundred board, e.g., teacher will direct student to place a marker on the square where 52 should be. Encourage students to explain the number patterns that help them locate the proper square. Try to locate other numbers.

See the sample worksheet on arrow math in the blackline masters.

C. Have students make calendars for the month and/or year and investigate the patterns that occur:

- Count the number of Sundays, Mondays, etc. in the month.
- Do some days occur more than others? Which ones?
- List Tuesday dates, Wednesday dates and Saturday dates. Can you find the pattern?
- Make a list of dates for each pair of Fridays, Mondays. Do you find any patterns in the list.
- If Tuesday is on the 5th, determine the date of the 3rd Tuesday without looking at a calendar.
- Look at different months and compare patterns. Are they the same?
- Look for dates in different months that occur on the same day of the week.
- Which months start on the same day of the week? Would this be different in leap year?
- Find the 3rd Wednesday of the month. Without looking at next month's calendar, tell what date three weeks later will be.

Investigate the computer software "<in Common> People, Places & Things" by Sunburst.

Notes and textbook references

D. Students should solve a variety of "in out" patterns by identifying the constant that operates on the "in" to produce the "out".

EXAMPLES: $(2x - 2)$ $(5x)$ $(3x - 5)$

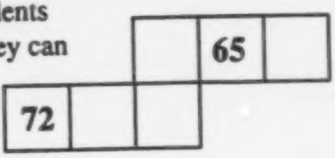
Build a function machine in your classroom. Put an "in" slot and an "out" slot. Students take turns being the brains of the machine.

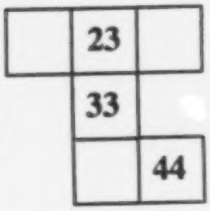
in	out	in	out	in	out
2	2	5	25	5	10
3	4	3	15	3	4
7	12	6	30	6	13

E. Use computer activities to reinforce your lessons: Math Shop by Scholastic (Repairs program).

F. Have students make a display of patterns in the school environment. For example, in numbering pages of books, the odd numbers are on right-hand pages. When students go down the hall, they walk on the right. The announcements come on the intercom right after the first bell.

G. Make number puzzles for students based on their hundreds boards. Once students have completed your samples, they can create puzzles for each other by cutting out shapes from grid paper.





3.2 *Demonstrate or describe patterns in geometry, data collection, and arithmetic operations.*

A. Have students work in pairs with a hundreds board and markers. Give the students the first three numbers in a pattern (include all types of arithmetical operations; multiples, additions, odds, etc.). Have them continue the pattern by covering the spaces on the hundred board. Students should verbalize their thinking.

B. Students will collect data from their own class and compare it to data collected from another grade level, on such topics as: foot size, height, favorite TV shows, favorite books, favorite musical groups, etc. Students will organize and display data into lines and bar graphs. Students can then discover and describe any patterns in the data.

C. Provide examples of numerical patterns that the student can explore with a calculator. For example, adding consecutive odd numbers will produce the square numbers: $1 + 3 = 4$, $1 + 3 + 5 = 9$ ..... Make a table to explore these patterns:

Consecutive Numbers	Number of terms	Sum of terms	Sum written as numbers squared
1	1	1	1^2
1 + 3	2	4	2^2
1 + 3 + 5	3	9	3^2

Notes and textbook references

D. In pairs, direct students to measure their arm spans and their heights. Record the class data and lead students to discover a relationship between the two measurements. Height and arm span measurements should be almost equal. The activity can be extended to show relationships between other body dimensions such as knees and necks. See 4.1D in the next goal.

E. Students will need hundreds boards and counters. Present guidelines and have them cover the answers and look for patterns. For example: Cover all the numbers that are multiples of 4. Erase board. Cover all numbers whose digits add up to an odd number. Erase board. Cover all numbers where the digit in the ones place is 1 more than the digit in the tens place. Erase board. Have children work in pairs and make up other directions.

F. Place 1/2 cup warm water from the tap in a glass on a table away from the windows or heat. Measure the temperature and graph. Add one ice cube. Stir to dissolve and record temperature. Add one more ice cube. Again, record the temperature on a graph. Repeat this procedure five more times. What do you notice about the data? Have other students replicate the experiment. Do you see any patterns in the data? Wait 30 minutes and measure temperature again. Repeat at half-hour intervals. Graph data and discuss.

3.3 Identify patterns as they occur in mathematical sequences.

A. Working in pairs with a calculator, students play "What's My Rule"? Partner A enters a number and passes the calculator to partner B. The second student enters an addition, subtraction, multiplication or division key and a number and $\boxed{=}$ before returning the calculator to partner A. Partner A then continues to press $\boxed{=}$ until he/she discovers the rule. For example, partner A enters 45 and passes to partner B who enters (-1.5 $\boxed{=}$). Partner B passes the calculator back to partner A who continues to punch $\boxed{=}$ until he/she discovers the (-1.5) rule. Roles then can be reversed.

B. **Growing Squares.** Divide the class into small groups. Give each group 100 color tiles or squares of construction paper. Have each group use one tile to make a square. Next, use four tiles to build a square. Have students continue the pattern by making each square bigger than the previous square. Have students continue the pattern by making each square bigger than the previous square. Have students make a table and record the number of tiles used on each side and the total number in each square. Challenge students to predict how many tiles or squares of paper would be used if a large square were 12 units across the bottom. Each group should write about patterns they find.

The National Council of Teachers of Mathematics will publish in 1993 an Addenda series book on patterns, K-6. Watch for information on this book!

Notes and textbook references

C. **Making L's.** Have students use tiles to make an L. Show them how to build the second and third figures and start a chart with them. Ask them to figure out how many tiles would be in the tenth figure. ***Extensions:*** Follow the same steps with other designs. ***Discussion:*** How can we predict the number of tiles we need for the twentieth figure without building it?

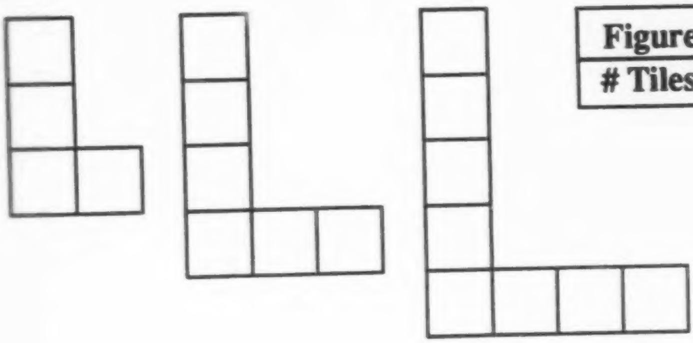


Figure	1	2	3
# Tiles	4	6	8

D. Students create a chart to discover multiplication and division sequences as repeated addition or repeated division. Examples of each:

- ***Problem:*** Sally makes $1.25 an hour for babysitting. How much money would she make for five hours of babysitting? Solution: fill in chart using pattern "Add $1.25." After babysitting for five hours, Sally makes $6.25.
- ***Problem:*** Ben had $16.31 at the beginning of the week. He spent 25¢ each for seven days. How much money did Ben have left after seven days?

3.4 Extend and make geometric patterns.

A. Working in pairs with pattern blocks and separated by a visual barrier (standing book), partner A will create a pattern concealed by the barrier. He/she will verbally direct partner B to replicate the pattern who must then continue it. Encourage students to give directions without color names.

B. Using a pattern block template, crayons and pattern blocks, ask students to create a geometric design on top of the template. Instruct students to trace the blocks in the pattern onto the template, and color the pattern. Student will then write an explanation of pattern.

C. Using pattern blocks, have students fit the shapes together to completely cover a plane, e.g., tiling a floor.

D. Using pattern blocks, students can create patterns that involve flips and turns. Begin with simple patterns that begin with one block and 1/2 turns or flips; progressing to combinations of blocks with other fractional turns and flips. Students should be given the opportunity to verbalize their pattern or write an explanation.

Notes and textbook references

E. Explore patterns with geometric progression relating the term (position in the pattern) and the number of segments used to create the design. Have students create the patterns with toothpicks or draw on isometric dot paper. Make a chart and look for patterns. Encourage students to seek several ways to describe the pattern. How many segments are in the 10th term? the 14th?

F. Create geometric patterns for the North Carolina bulletin board. Plan two days to try the Carolina Star project at the end of this section.

3.5 Given a table of number pairs, find a pattern and extend the table.

A. Using a multiplication chart, students will select a number from 2 to 12 and write all the multiples of the number they choose until they reach 144 or as close as they can get. They will then color in the squares on the chart and compare the design with one someone did for another number or choose a different number from 2 to 12 and make a new design.

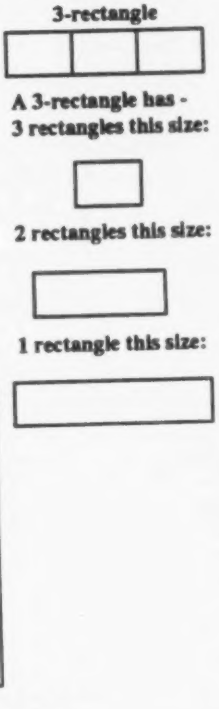
B. Use charts to solve problems such as the following:

- How many calories are in a dozen doughnuts if each doughnut has 95 calories?
- How many half dollars are in $12.00?
- You owe your mother $16.50. You agree to pay $1.50 each week until the debt is paid. How many weeks will it take to pay the debt?

Donuts	Calories
1	95
2	190
3	

This Rectangle Activity is adapted from the National Council of Teachers of Mathematics series called the Addenda Project. *The activity is found on pages 5 and 6 of the Grade 4* Addenda.

C. **How Many Rectangles Do You See?:** Some children will reply that there are three rectangles; others will say that there are more than three. Help them to see and count the total number of rectangles. Refer to the drawing as a 3-rectangle because it is made from three small rectangles (three 1-rectangles). Draw a 4-rectangle and give the class some time to count the total number of different-sized rectangles in a 4-rectangle. How many 1-rectangles are there in a 4-rectangle? How many 2-rectangles? How many 3-rectangles? Can you explain your answer? What about a 5-rectangle and a 6-rectangle? Is there any pattern that you can see in these investigations? Help the class in organizing their information for each rectangle into a table.



Type of large rectangle	Total number of different-sized rectangles
1-rectangle	1
2-rectangle	3
3-rectangle	6
4-rectangle	10
5-rectangle	15
6-rectangle	21

Fourth-grade is not too early to ask students to look for patterns in tables horizontally as well as vertically. As they try to find the relationship of the total number of rectangles in consecutive terms, they might discover a relationship between the type of rectangle and its total. (In a 4-rectangle there are 10 rectangles 1 + 2 + 3 + 4 = 10.)

Notes and textbook references

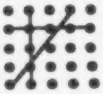
After students have explored the rectangle problems, with the class make a table that records the total number of different-sized rectangles in each large rectangle. Enter the data for a 4-rectangle and a 3-rectangle. Ask the children to fill in the total number of rectangles for the remainder of the table and to look for patterns.

Discuss the idea that being organized and systematic is helpful in seeing patterns and becoming confident in solving these type of problems.

What patterns can you find in the table? For example, the total number of rectangles for a 4-rectangle drawing is 4 more rectangles than for a 3-rectangle drawing. The total number of rectangles for a 5-rectangle is 5 more than for a 4-rectangle, and so on.

- How many rectangles will there be in a 7-rectangle? (21 + 7, or 28).
- If there are 210 rectangles in a 20-rectangle, how many will be in a 19-rectangle? (210 - 20, or 190). In an 18-rectangle? (171).
- If there are 66 rectangles altogether, what kind of rectangle (i.e., *n*-rectangle) do we have? (11)

E. Using geoboards, give students the following directions:



- Place one rubberband as a line segment that goes across the entire geoboard. Record total number of sections the board is divided into (2).
- Place a second rubberband on geoboard perpendicular to the first. Record the total number of different sections (4).
- Add a third rubberband as a line segment which intersects other line segments on the geoboard.

Have each pair of students or each student create a table. Extend the table until they have placed five rubber bands on their boards:

Rubberbands	Section
1	2
2	4
3	
4	
5	

Discuss with the class why their charts might be different. If they had drawn line segments on a piece of paper with the directions being to make as many sections as possible, would their charts be more alike? Try this!

F. Begin tables such as these and have students extend the patterns.

CARS

Cars	Tires
1	4
2	8
3	___
___	16
6	___

DICE

Dots on side one	Dots on opposite
3	4
1	___
2	___

FOWL

Chickens	Legs
1	2
2	4
3	___
4	___

3.6 Use patterns to make predictions and solve problems; use calculators when appropriate.

Notes and textbook references

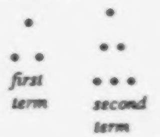
A. Provide students with examples of problems which may be solved in similar ways to help them internalize strategies. Never limit problem solving to one strategy but model a variety of situations where a given strategy may be helpful.

B. Use the public library to get information on daily temperatures for a period of time during the previous year. From this information students will predict the range of temperature for the same time period in the current year, then gather data to compare. ***Challenge:*** Enter data into the data base of a computer, plot both sets of information and graph them.

C. Suppose you have an umbrella rental stand in North Carolina. Where and in which months of the year would generate the most business?

D. Using counters, ∴ make a pattern with three counters. Ask students to help you decide what the next terms will look like. Then have students predict what the 10th, 15th, and 20th terms will be. Orally, discuss what the pattern is and the reasons for their answers.

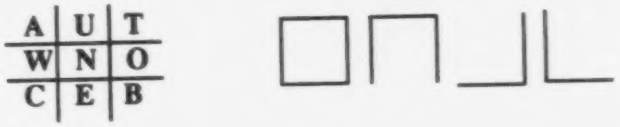
Show students the third term.



E. Investigate the sums of odd and even numbers while reviewing number facts. Each student needs grid paper, crayons, and digit cards with 0 to 9. Students should first cut out strips that are two squares wide by the length of the grid paper. For each number, 1 through 9, have them try to color a rectangle that has a dimension of two squares on one side. Talk with the students about modeling numbers as odd or even with rectangles of two squares on one side. Even numbers will make these rectangles, but odd numbers will not. Cut these figures out. Next, choose a number, for example 7, and find the model. Then pick up a second number and find that model. (For example, 3). These two models will fit together to form a rectangle. Have students make a chart as they work.

First Number	Second Number	Sum
7 odd	3 odd	10 even
5 odd	2 even	7 odd

F. Draw a tic-tac-toe grid. Put one letter inside each grid space. Each letter will have its own pattern. Draw the pattern to make words.



= NEAT

G. Each student needs a partner and 18 blank tiles or squares of paper. Working together, have students make rectangles using all 36 tiles. How many different rectangles are possible? Color the rectangles on grid paper. Ask students to find the perimeter of each of these figures. Are any of the perimeters the same? If one square is removed from a rectangle, does the perimeter change? Does it matter which square is removed? What shape rectangle has the largest perimeter? the smallest? Investigate the rectangles you can make with 3, 5, 7, 8, 12, 16, 19, and 24 tiles. What do you notice about these?

H. Use the constant key of the calculator to quickly solve problems that have a pattern such as: John is between 115 and 120 cm tall. His height is a multiple of 9. How tall is John? Count the mulipples of 9 by using the $\boxed{+}\boxed{9}\boxed{=}$ keys to find John's height.

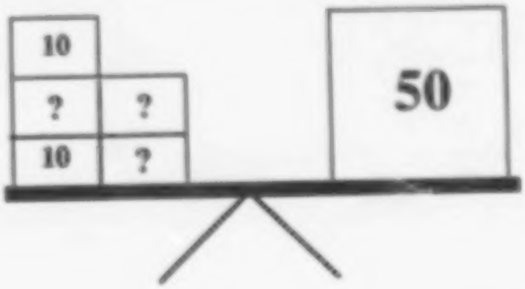
3.7 Use intuitive methods, inverse operations, and other mathematical relationships to find solutions to open sentences.

A. Using a balance, have students find the mass of an apple. Discuss the numbers and size of the weights added in order to balance the weight and the mass of the apple. Write an equation, recording your results.

Example: _____ gms + _____ gms + _____ gms = gms of apple.

Use other fruits or vegetables to repeat the activity.

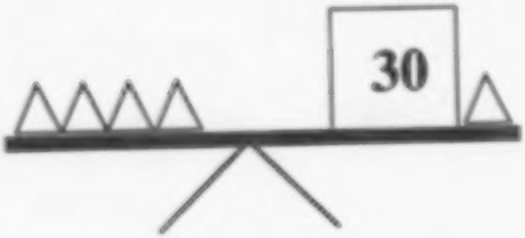
B. Generate a series of problems like the example below:



10 + (_____ + _____) + (10 + _____) = 50

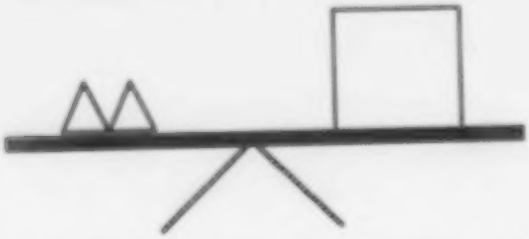
How does the above picture and the equation help you think about this problem?

If you have a balance and materials which will balance, have students begin these activities at a concrete level.



What is the value of the Δ ?

C. Show students a picture such as this:



What do you think it means? Have students decide the values of the Δ or the □ when you give them information such as:

If a Δ is 3, the □ is _____.

If the □ is 8, each Δ is _____.

If the Δ is 10, the □ is _____.

Ask students to suggest other values for the Δ and the □.

D. Game: **Equation Creation.** Divide the class into heterogeneous groups of four. Give the groups a set of time (for example, 20 minutes) to follow these directions:

1. You can use any of the four operations (+, -, ÷, x) in any combination.
2. Use the digits 0 to 9 only once in any part of the equation (You do not have to use all digits.)
3. Create as many different equations as possible.
4. Score one point for each correct equation. For example, 4 x 5 = 20 allowed, 4 x 6 = 24 not allowed (4 is repeated).

You can vary the activity by changing the digits or the operations.

E. Use the charts (3.5F) for cars and tires and the chart for chickens and legs to help students begin to analyze charts horizontally as well as vertically. Have students talk about the numbers in the second column in terms of their partner's numbers in the first column. For example, in cars and tires chart, the second column is four times the number in the first. For ten cars, there would be 10 x 4 or 40 tires. For "*n*" cars there would be *n* x 4 tires.

Relate the columns of the cars and tires chart to ordinal pairs which students could plot on a coordinate grid.
(1, 4)
(2, 8)
(3, 12)
(4, 16)
(5, 20)
How would the graph be labeled? If you connected these points, what would the results look like?

Which number does not belong?

3 7 8 9

Why do you say this?

MATH JOURNAL IDEAS:

1. How do you like to learn math best?
2. Sometimes it is okay to estimate. Give some examples of when we need exact numbers.
3. What are some things that you can do in a minute?
4. Write a short letter to your friend to tell what you did in math today.

MORE MATH JOURNAL IDEAS. . .

1. What did you like best in math today?
2. Dear teacher, in math I am confused about. . .
3. You are the author of a math textbook. Write a step by step description of how to multiply a two-digit number by a one-digit number.
4. If the answer is 24, what could the story (and questions) have been?

The learner will understand and use standard units of metric and customary measure.

4

4.1 Select an appropriate unit and measure length (inches, feet, yards, centimeters, and meters).

Notes and textbook references

A. Long ago, people used body parts to measure length:

- cubit - distance from elbow to fingertips
- yard - distance from nose to fingertips with arm outstretched at the side
- pace - a double step
- mile - 1,000 paces

Using the above information, have students compare these personal measurements to standard units of measurements.

B. Explore using the scale on the official North Carolina map to find the distances such as from Raleigh to Wilmington in miles and/or kilometers.

C. Have a group or pairs scavenger hunt.

- Find something 1 meter long.
- Find something 1 foot long.
- Find something 6 inches wide.
- Find something10 centimeters long.
- Find something greater than 2 meters in height.
- Find something about 50 centimeters tall.
- Find something between 9 and 12 inches long.
- Find something between 2 and 3 feet tall.
- Find something 1 yard long.
- Find something 1 inch long.

Have each group report their findings to the class as a whole group.

D. **Are You a Square or a Rectangle?** How does your height compare to your arm span? Make a prediction - how many centimeters tall are you? How many centimeters wide is your arm span? Measure to find out. . .

Are you a square? height = arm span
Are you a tall rectangle? height > arm span
Are you a wide rectangle? height < arm span

Graph the results for the class. Allow students to draw themselves as squares, tall rectangles or wide rectangles.

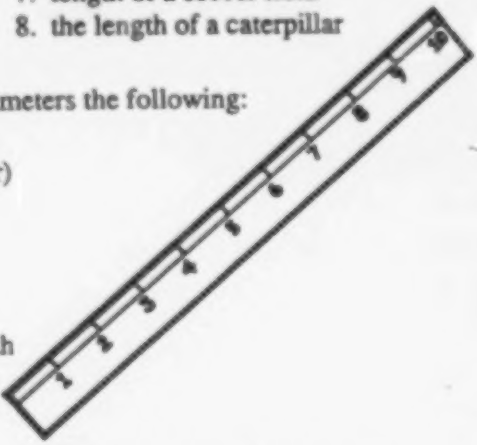
Notes and textbook references

E. Have students determine the appropriate kind of measurement for the following:

1. length of your hair
2. length of your state
3. distance of a walk
4. width of your classroom
5. distance of a ship voyage
6. height of a door
7. length of a soccer field
8. the length of a caterpillar

F. Have students estimate in centimeters the following:

1. the height of their face
2. the width of their face (ear to ear)
3. distance between their eyes
4. width of their eyes
5. length of their nose
6. width of their nose
7. distance from their nose to mouth
8. width of their mouth
9. height of their ears



Have students list examples of things they might measure in miles, in feet, in yards, in centimeters, and in meters.

After students make estimates, give out centimeter rulers and drawing paper. Students must draw their face and features according to the estimated measurements. The drawings must be accurate to the estimated measurements.

After students finish drawings, they can measure actual face measurements with a partner.

G. How many nickels could you stack up before they would fall? How tall a stack is this? How much is it worth? How much would a stack of dimes the same height be worth? If you could stack $100 worth of nickels, how tall would the stack be?

4.2 Weigh objects using appropriate units and tools (ounces, pounds, grams, kilograms).

A. Estimate the weight of your textbooks. Then weigh each and find the combined weight of the textbooks. What is the weight of all the textbooks in your class?

B. Pick up two objects. Put one in each hand and try to decide which is heavier. Check by weighing the objects. Try this again with many different objects. Find two objects you think weigh the same. Check by weighing.

C. Have each group of students estimate the weight of five objects and put the objects in order from least to greatest weight. Students then weigh each item and reorder, if necessary. Display results. ***Variation:*** Compare objects with an arm balance rather than weighing on a scale. Using comparisons, order the objects from lightest to heaviest. ***Journal entry:*** Describe how you decided the correct order of the objects.

Notes and textbook references

D. Give each group of students five items of differing weights. Students weigh each object and create riddles for the five items related to their weight. Allow the students to exchange their objects and riddles with other groups. ***Example:*** This item does not weigh the most. This item weighs more than five grams.

E. Have students participate in or develop a scavenger hunt to discover more about ounces, pounds, grams, and kilograms. For example, find something with a mass of about 280 grams. Find something with a mass of about one kilogram. Find something weighing about one pound.

F. Give groups of students an assortment of foods that have peels, shells or other removable coverings. Groups estimate the mass with the covering and without the covering, then weigh and record to find out the actual mass. Possible foods to use: banana, orange, peanut, peach (remove pit).

G. Estimate the weight of a pumpkin. Then, weigh the pumpkin and determine who had the closest estimate. Guess the circumference of the pumpkin before measuring it. Record who had the best estimate. Make your pumpkin into a jack-o-lantern, and compare the before and after weights.

H. Give each child a piece of bubble gum (not sugarless). Remove the wrapper and allow each student to weigh the gum in an individual cup. Ask each student to chew the gum for "*x*" amount of minutes. Predict if the gum will weigh more or less after chewing. Place gum into cups and weigh again. (The weight lost is sugar.)

I. Does one cup of everything weigh the same? You will need an equal arm balance, styrofoam cups and different materials to weigh - North Carolina materials can be used: shelled peanuts, unshelled peanuts, beans, cotton balls, sand, small rocks, etc.

J. Weigh an egg. Boil the egg and weigh again. Compare the weights. Peel the egg and weigh again. Is there a difference?

K. Have pairs of students make their own balance scale using a coat hanger, two paperclips, and two plastic or paper cups. Then give them sets of objects to estimate and compare weights.

L. Ask the students to bring in an assortment of trash to school (clean and safe throwaway objects: cardboard paper towel tube, empty jug, food box, old mitten, etc.) Gather measuring tools for finding length, surface area, and weight and make the tools available to the students. Discuss various techniques for measuring standard items with unusual shapes. Have the students record the measurements in chart form.

M. Have students create and construct gingerbread houses out of graham crackers, cake icing, gumdrops, M & M's, lifesavers, etc.. Instruct the children to weigh their finished products. By observation, have the children find a gingerbread house that they think weighs approximately the same as their own. Weigh the gingerbread house in question to find out if their guess was correct.

4.3 Measure capacity with appropriate units (milliliters, teaspoons, tablespoons, cups, pints).

Notes and textbook references

A. Have a capacity Scavenger Hunt:
- Find something containing more than 1 liter.
- Find something containing about 1 pint.
- Find something containing about 8 tablespoons.
- Find something containing about 300 milliliters.

B. Have groups brainstorm lists of items that they know are measured with milliliters, teaspoons, tablespoons, cups, pints, etc. Organize and display the information. What inferences can they make? What questions arise?

C. Have students estimate the order of several containers from greatest to least capacity. Check estimates by filling the containers with a like substance and measure the amounts. Have students record their results.

D. Estimate the capacity of various containers filled with beans, rice, popcorn, etc.. Pour into a calibrated jar to find the actual capacity.

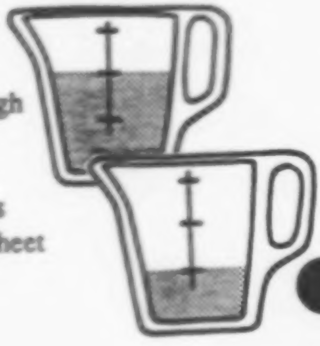
E. Allow students the opportunity to practice metric measurement by making Metric Sourdough Bread. ***Starter:*** 7g. dry yeast (one package); 625 mL warm water; 500 mL flour (white, or part wheat); 20 mL sugar

1. Dissolve yeast in 200 mL warm water
2. Stir in remaining ingredients
3. Cover with paper towel or plastic wrap
4. Let stand in warm spot in the room five days
5. Stir three times daily

Refrigerate the starter until ready to use if necessary.

Sourdough Bread: 7g dry yeast (one package), 375 mL warm water, 250 mL sourdough starter, 15 mL salt, 20 mL sugar, 5 mL baking soda, 1400mL flour.

1. Soften yeast in water
2. Add starter, salt, sugar and 600 mL flour
3. Cover - let rise until bubbly (1-2 hours)
4. Mix 600 mL flour with soda and stir into dough
5. Add enough flour to make stiff dough
6. Knead ten minutes on floured surface
7. Divide the dough in half. Let rise ten minutes
8. Shape two loaves - place on greased baking sheet
9. Cut diagonal slashes across the top



Bake in a 400° oven for about 35 minutes.

4.4 *Identify a model that approximates a given capacity unit (cup, quart, gallon, milliliter, and liter).*

Notes and textbook references

A. Have students compare the capacities of the small, medium, or large drink cups at local fast food restaurants. Are there differences from one restaurant to another? Which restaurants use 8 oz. cups?

B. Make a display of containers/products which hold similar amounts. Display the containers with written information for the viewers as in a museum.

C. Collect labels and create posters to relate familiar products with the capacities of the containers.

4.5 *Estimate the number of units of capacity in a given container and check the estimate by actual measurement.*

A. Using a teaspoon and a small plastic cup, have students work cooperatively to estimate the number of teaspoons of water it will take to fill the cup. Fill the cup, one teaspoon at a time, to determine the actual number of teaspoons needed. How close was the estimate?

B. Estimate the amount of popcorn it takes to fill a cup. Use this information to estimate the amount of popcorn it takes to fill a quart and gallon. Check your estimate.

C. Fill a container with dry beans. Have empty containers available in these sizes: cup, pint, quart, gallon and liter. Be sure containers are labeled. Allow pairs of students to measure. Encourage the students to find answers to questions such as: How many cups in a gallon? How many pints in a quart? Which is larger, a liter or a quart?

D. Estimate the amount of water you think you can squeeze out of a wet sponge (only one squeeze allowed). Then, after soaking the sponge in water, squeeze it into an empty measuring container. Record each student's estimate and the actual results of the experiment. Organize and display the data. Compare the results of the experiment to estimations.

E. Peanuts are a Coastal Plain speciality. Have students estimate the number of shelled (or unshelled) peanuts required to fill up a quart-sized baggie. Then, after determining the number of peanuts in a quart, have students determine how many pint-sized baggies can be filled from the quart of peanuts. Would the number be the same if you were to use quart-size and pint-size jars?

Notes and textbook references

F. Have students work in groups. Take two 9 x 12 inch sheets of construction paper. Make a round tube by rolling one piece the long way. Tape the edges where they just meet. Roll the other piece the other way and tape. Will one tube hold more than the other or will both tubes hold the same? Record all guesses. Using corn (a Piedmont crop), let students record the amount each will hold.

G. Bring pots and pans of different sizes to class. Have students order them from least to greatest according to their estimated capacity. Use water or dry beans to check estimates and reorder as necessary.

4.6 Compare units of length, capacity, and weight within the same system.

A. Demonstrate, using a cubic container of 500mL with base 10 blocks, water and a balance scale, that one cubic centimeter is equal to 1 milliliter of water. It is also equal to one gram of water.

B. Using a calculator, compare the size and mass of commercial products that come in various sizes, e.g., a small box of cereal compared to a large box. The students can compare the difference in box size with the difference in mass. It is also a good opportunity to work with unit price.

C. Direct each child to draw a map of the classroom. (Be sure to include locations of pencil sharpeners, wastebaskets, clocks, hamster center, etc.) Let the individual child's desk be the focal point of the map. Have each child choose 10 locations within the classroom that are illustrated on his/her map and measure the distance from his/her desk to each of the chosen spots. Include the measurements on the individual maps.

Consider the computer software "Math Spotlight: Weights and Measures" by Scholastic.

D. The teacher will prepare a "Metric bug" on four-inch grid paper. Display for students. Each student will copy the "bug" on one-inch grid paper. The "bug" may be very simple with head, body, antennae, features of your choice! This proportional activity may be repeated with many different pictures. Also, it can be done in reverse; allowing the students to draw a portion from the small grid and then assemble to make a larger picture.

E. Use corn, rice, water, sand to have students experiment and complete charts such as these:

1 tablespoon = _____ teaspoons
1 pint = _____ cups
1 quart = _____ pints
1 liter = _____ militer

Notes and textbook references

F. Estimate how many centimeters it is around your largest classroom bulletin board. Then, after measuring the number of centimeters, dertermine how many meters the same distance would be.

G. Organize your class into "measurement squads." Have them practice measuring accurately with both standard and metric measure. Send a message to the K-2 teachers that the "measurement squads" will come and measure their students for them and make a chart showing the results.

4.7 Explore elapsed time problems using clocks and calendars.

A. How many months during the previous year began on the same day?

B. Pose these questions to students:

- If it is 2:00 p.m. now, how long is it until 8:00 p.m.? How long is it until 11:30 p.m.?
- If it is 7:00, what time was it 9 hours ago?
- If it is 6:00 now, what time will be be 5 1/2 hours from now?

Then let students or groups of students make up more problems and find the answers. Be certain that students know how a quarter to ten, for example, looks on a digital watch (9:45).

C. After giving students opportunities to explore numerical patterns on the calendar, try these mental math items:

- If Friday is the 15th, what date will next Monday be?
- What is the date one week before Christmas? Halloween? Valentine's Day?
- What is the date one week after Christmas? Halloween? Valentine's Day?
- Encourage students to create other similar questions.

D. Allow students to plan a trip (in pairs or small groups). Have them estimate distance and time involved. Then have them use the actual scale of the map and standard speed limits to calculate the elapsed time for the trip if they left at a designated time. When completed, have them figure again with a variety of obstacles or events added to the trip.

Allow students to plan a trip to another North Carolina county located in a region other than their own.

E. Make a timeline depicting famous North Carolina "firsts". Discuss elapsed time.

F. Have the students use poster or tag board to make larger clocks or watches. They can be traditional or digital and should show a specific time. Hang clocks in room. The students choose one of the clocks and answer questions similar to the following:

- What time was it an hour ago? Forty-five minutes ago?
- How much time will pass before lunch? P.E.? etc.
- What time was it 3 hours and 32 minutes before the time on your clock?

Notes and textbook references

G. Choose a city in a different United States time zone. If it is 8:30 a.m. at your school what time would it be in that city?

H. Divide students into pairs. Each student will time a partner for a one-mile run. (Continue activity for a one-week period). Graph each day's time.

I. Duplicate pages from TV Guide or television schedules from a newspaper. Have students draw times on clocks to show when favorite programs begin and end. Discuss how much time students spend watching television. Record the length of time of your favorite television shows. How many commercials were there during your show? How much time was spent in commercials? How much time was spent on the actual show? ***Note:*** Consider turning these ideas into a study over a couple of weeks. Collect data and graph the amount of time spent watching television. Have students decide what other data could be interestingly displayed. (See objectives in goal 6.)

4.8 Use appropriate language and proper notation to express and compare money amounts.

A. Have students list different money combinations to equal $10.00. You may wish to limit the number of coins.

B. Calculate: if lunch costs $1.15, how much does it cost to feed a student throughout the school year? How much would it cost to feed your whole class?

C. Using different catalogs, compare prices of specified items to determine which would be the best buy.

D. Ask the students to write any six amounts of money from 20¢ - $25.00 in the left margin of their paper. Then have each student write or draw two different combinations of coins or dollars to make up each amount. Have them write both the number and the name value of each coin used.

E. Use a money place value board. Place different money amounts on the place valueboard. Record the correct notation.

F. Set up a grocery store in the classroom. Price each item. Students can buy items totaling up to a given amount. Have a clerk give the proper amount of change to the shopper.

G. Have students plan trips comparing costs and travel times of various modes of public transportation. Discuss the pros and cons of each option.

Notes and textbook references

H. Make a set of 35-40 cards with notations such as: You earn $5.75 mowing the yard; you spend $7.25 at the movies, etc.. In a small group lay the deck in the middle of the table and assign each group member the same amount of pocket money ($15.00, $25,00, etc.) Each student in turn draws a card which adds to or subtracts from his starting amount. Students must record and compute earnings with each turn and verbally tell the group what amounts they lost or received and now have.

I. Estimate and research how much the governor of our state makes per year. Based on his current salary, how long (in years) would it take our governor to become a millionaire?

J. Divide the class into teams. (Each team may have 1-15 members.) Each team will need access to a chalkboard and a piece of chalk. The object of the game is for each team to write as many correctly constructed sentences about North Carolina as they can in two minutes. Each player writes one word of the sentence before passing the chalk to the next person. Proper punctuation should be used at the end of the sentence without counting as words. After a sentence is completed, turns continue to rotate until the time limit is up. Scores are calculated by the following formula:

- Each word equals 1¢.
- Each vowel equals 25¢.
- Each word with more than three syllables equals 30¢.
- Each adjective equals 49¢.

K. Have students read Alexander Who Used To Be Rich Last Sunday by Judith Viorst.

- Compute the amount of money Alexander's two brothers had.
- Using a hundreds board, tell the students that the board represents $1.00. As they progress through the book, have students subtract amounts mentioned in the book.
- Write the sequel Alexander Who Will Be Rich Again Next Sunday. Have Alexander's wealth increase daily.

4.9 Use models to develop the relationship between the total number of square units and the length and width of rectangles. Measure perimeter and determine area of rectangles using grids.

A. A room is 10 feet by 12 feet. What is its perimeter? How many students (standing shoulder to shoulder) would it take to outline the room?

B. Puzzling Perimeters - Have groups of students build rectangles with 1" tiles or squares with whole sides touching. How many shapes with different perimeters can you make for these areas? Look for patterns:

Area - 8 squares; 9 squares; 10 squares; 12 squares

Count the perimeter of the shape. Record the shape on graph paper.

Notes and textbook references

C. Provide students with 1" tiles or squares. Have them form rectangles, keeping a record of the width, length, and area of each rectangle. Encourage them to look for patterns and relationships.

D. Ask the children to find how many different shapes a house could be built if it had an area of 1000 square feet. (A scale of one grid square could equal ten feet.) Have the children illustrate their findings.

E. Using hexagons, blue parallelograms, and triangles, create a design with a perimeter of 24 units (the length of one side of the pattern blocks is your unit of measure). Trace design onto triangular grid paper. Explore the area of the different designs. Are they the same? different?

F. Using a North Carolina map, students will practice using grid coordinates by locating Stokes, Rockingham, and Caswell counties. Next, using geoboards, the students will create the shape of each county with the following perimeters:

Stokes	P = 16
Rockingham	P = 20
Caswell	P = 12

Then, using grid paper, cut out the shapes of the counties. Record the areas of the counties.

4.10 Find the approximate area of regular and irregular figures using grids.

A. On grid paper, trace the following: bottom of your shoe, your hand, cover of a book, etc. Shade areas that are completely covered or at least half covered. Estimate the area in square units.

B. Using centimeter grid paper with wax paper on top, have students estimate the largest bubble they can blow on the wax paper with a straw. Students then blow their bubbles using the straw and a mixture of Dawn detergent and water. (Two parts water to one part detergent.) Apply the soap solution to a section of the wax paper. Hold the straw at a 45° angle and blow into the solution to form a bubble. This would also be a good opportunity to measure using time: How long will the bubble stay without popping?

C. Give students a ball of "play-dough" approximately 2" in diameter. Have them spread the dough on wax paper as thinly as possible. Trace around the dough shape with a marker. Remove the dough shape from the wax paper. Then put the wax paper over grid paper and count the area of the outlined shape.

D. Cut out the outline of your county from a North Carolina map. Place your county's outline on grid paper and find the area. Compare the size of your county to the size of other counties. Find other counties that are approximately the same size as your county.

E. Divide and cut out the three regions from a North Carolina map. Using multiple sheets of grid paper taped together, trace the outline of each region. Are all regions of equal size? Find the area of each and compare.

F. Give each child a chocolate chip cookie. Before eating the cookie, find out:

- cookie weight in grams
- area of one surface
- diameter
- perimeter
- the number of chips in each cookie
- the average number of chips per cookie for the class
- the total of chocolate chips in the class's cookies

How many cookies would it take to fill up one cup? (The children will need to crush their cookies to find out this information.) In order to utilize the crushed cookies in a yummy way, make a dirt pie. Alternate layers of crushed chocolate chips with Cool Whip. If you really want to give an authentic look, make the dessert in a (clean) clay or plastic flower pot.

4.11 Formulate and solve meaningful problems involving length, weight, time, capacity, and temperature; and verify reasonableness of answers.

A. Have students draw and discuss the kind of clothes they would wear if it was 50° Celsius. Encourage students to choose and illustrate another temperature. Have others guess the temperature that is represented.

B. Estimate the number of Unifix cubes it takes to make 1 foot or 1 yard. Check your estimate by measuring with a ruler. How could you use your estimate to estimate the perimeter of the classroom?

C. Discuss how many Unifix cubes it would take to equal the height of "Old Baldy" lighthouse located on Bald Head Island? Explain how you determined your answer.

D. Explore measurement related questions such as:

- Which would weigh more — a quart of miniature marshmallows or a pint of cotton balls?
- How many hours are there in a month? a year?
- How many days old are you?
- How many 2-liter drinks tall is the Cape Hatteras lighthouse?
- Would the combined heights of all of your classmates be less than, equal to, or greater than the height of the Wright Brothers' Memorial?

Notes and textbook references

E. Have students investigate which careers or businesses use measurement tools for length, weight, time, capacity and temperature. Invite guests to discuss how the tools are used in their occupation. Have students or groups of students brainstorm possible problems these workers would encounter and ways to solve the problems.

F. Have students put ice cubes in water and read the temperature of the water. Add rock salt to the ice water and read the temperature again. What does the salt do to the temperature? How does this relate to making ice cream?

G. Have groups of students plan a garden 6m x 5m using the following guidelines:

- Separate the garden into equally spaded rows.
- Choose three vegetables to plant.
- Each vegetable must be spaced one meter apart.
- Illustrate the different ways your garden could be planted.

H. Use favorite food items or fruits and vegetables to estimate and take measurements. Use thermometers to take temperature of food items and record the change in temperature during refrigeration and cooking.

I. Estimate and record the time necessary for a food item to change temperature from cold or hot to room temperature and vice versa.

J. Help students to become knowledgeable about the characteristics of various temperatures (both Fahrenheit and Celsius). Create a "Temperature Concentration Game" by giving each child two squares (3" x 3") of drawing paper. On one square the child should write a temperature. On the other square, the child should draw a scene or something depicting the temperature chosen. After all children have finished their tasks, the square cards should be collected and shuffled several times. Once the cards have been thoroughly mixed, the teacher then puts consecutive numbers on the back of the randomly stacked cards. The game then proceeds using the rules for the television version of "Concentration." The child with the most matches is the winner.

K. Determine the total length of your classmates if all members were stretched out on the floor (touching, but not overlapping, from heads to toes). Length could be measured in feet, meters, inches, etc.. Find a class in your school who is closest to your same length.

L. Show the same temperature on a theromometer that has increments of 1 degree and another thermometer that has increments of 2 degrees. How can you tell which is which?

The student will solve problems and reason mathematically.

5

5.1 Develop an organized approach to solving problems involving patterns, relations, computation, measurement, geometry, numeration, graphing, probability and statistics.

Notes and textbook references

A. Open-ended problem solving should be an integral part of every school day. Problem solving strategies should be the emphasis. Students should be encouraged to verbalize their thinking and share strategies. A "GOOD STRATEGY" bulletin can be developed by the students. Marcy Cook's books provide examples of "Stumper Problems."

B. Determine the minimum number of colors needed to color a 100 county map of North Carolina without having any same color to touch. How might you figure out an answer without coloring all 100 counties?

C. Explain two possible ways to find the perimeter of a triangle that has 3 equal sides, each 7 inches long.

D. Using pattern blocks, assign each pattern block a monetary value. Students make patterns or pictures and calculate the value of the pictures or have students make three congruent designs whose total value is a given amount (a multiple of 3 such as 36¢ or $4.80).

E. Use the mileage chart on a North Carolina road map and compare distances between cities across the state. Compute the difference in the distances. For example:

Jacksonville to Hickory is 275 miles
Jacksonville to Blowing Rock is 307 miles.
It is 32 more miles to Blowing Rock from Jacksonville than to Hickory from Jacksonville.

F. Draw a circle on a map of the southeastern United States with the center at Murphy and the radius of the circle reading Raleigh. (Your circle's diameter will be 710 miles since it is 355 miles from Raleigh to Murphy. Ask students to explore:

- Which state capitals are closer to Murphy than Raleigh?
- Which is closer to Murphy - Atlanta, Georgia or Charlotte?
- It is more than 500 miles from Murphy to Manteo. Suppose you traveled 500 miles from Murphy in other directions. Where might you go?

Notes and textbook references

G. **Free Ride:** Place 10 toothpicks on the table. You and your partner take turns picking up either one or two toothpicks. The player to pick up the last toothpick wins a free ride. Can you figure out how to get a free ride every time? Help students look for a pattern by:

- working backwards
- making a simpler problem
- making a table to illustrate the pattern

H. Materials needed: Handout of North Carolina (gameboard, blackline master), pattern blocks - yellow hexagons, red trapezoids, blue rhombuses, green triangles. **Rules:**

- For each turn, students select a pattern block to place on North Carolina gameboard.
- To win, a player forces the opponent to place the last piece on the gameboard.

5.2 Communicate an understanding of a problem through oral and written discussion.

A. Have students work in pairs, discussing as they work problems in the text, will allow them to hear how other students view a problem and its solution. Ask each student to tell how they began to solve the problem and how the solution was carried out.

B. Display this information for your class:

Deluxe Burger	$1.98
Coke	.60
Fries	.55

Stan Kazan has a $10.00 bill.

1. Students individually write one question that pertains to the information.
2. Students read their questions to their group and everyone decides if it can be answered with the information.
3. Students solve the problems their group wrote and compare answers and processes.

C. Give each student a word problem that is written on a 3" x 5" index card. Ask the students to rewrite the problem in their own words on the back, exchange cards with a neighbor and solve the rewritten problem. Have the class discuss the success of the activity. Were the problems reworded clearly or did they have to flip back over to see the original problem?

D. Play a version of "Guess My Number" using hundred boards. The children may ask five "yes or no" questions to determine the mystery number. Stress the importance of asking relevant questions to narrow down the choices. A good question might be: Is the number greater than or equal to 50? A poor beginning question might be: Is the number on the first row? Encourage children to creatively tie in questions concerning even and odd numbers, multiples, factors, sum of the digits, etc.. What is the least number of questions needed to be absolutely certain of the answer?

5.3 Determine if there is sufficient data to solve a problem.

Notes and textbook references

A. Have students make up their own word problems leaving out some important information. Ask them to present their problem to the class and have the group discuss what is needed in order to work with them successfully.

B. Give students a variety of problems, with and without sufficient data, asking them for the solution. If they decide that there is insufficient information, ask them to supply the missing information.

C. Have the students list the information necessary to find the answers to questions such as:

1. How much change would you get back from a lunch order at McDonald's?
2. How many bricks would be needed to build a house?
3. How many drops of water would you need to fill a swimming pool?
4. How much would it cost a family to get into Disney World?

5.4 In solving problems, select appropriate strategies such as: act it out, make a model, draw a picture, make a chart or graph, look for patterns, make a simpler problem, use logic, work backwards, guess and check, break into parts.

A. Have a "problem of the day" board and ask students to write down their strategies and solutions with extra credit for trying and solving hard questions.

B. Placing students into small groups, assign a specific task, asking the group to generate two to three different ways to solve the problem.

C. Allow the students to work in pairs. Have them complete the tasks and chart the results on a master list. Alternate counting and doing the task.

1. Count the number of jumping jacks a student can do in one minute.
2. Stand on one foot and count how many hops can be made in one minute.
3. Toss a ball in the air and catch it. Count how many times this is done in one minute.
4. Put a meter stick on the floor. Start a race car at the 0 cm mark. See how far it will move if you blow on it once without touching it.

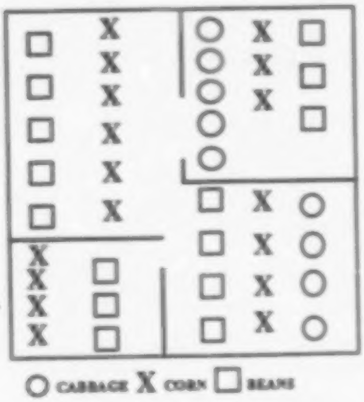
D. What is the perimeter of North Carolina? Estimate. In groups have students use a North Carolina road map and string to measure the perimeter of the state. Use a calculator and the scale of 1" equals approximately 13 miles. Compare the results from each group and as a class agree upon an approximate number of miles for North Carolina's perimeter. Save the data for other activities.

Notes and textbook references

E. Use the "Exploring Cubes" activity found at the end of this section. This activity integrates spatial skills, the need for an organized approach and a way to keep records, and geometric concepts related to transformations.

F. Whose garden is whose? Susan, Al, John, and Tonya have gardens. Figure out whose garden is whose by using these clues:

- The boys both have an odd number of plants.
- One of the girls has the smallest garden.
- John has no cabbage.
- Susan has the same number of each crop.



Encourage students to write logic puzzles for their friends.

G. Read George Washington's Breakfast by Jean Fritz. What did George Washington have for breakfast? How did Washington determine the number of seeds in a pound of red clover or a pound of Red River grass?

5.5 *Estimate solutions to problems and justify.*

A. Have students estimate and justify answers to questions such as:

- How many jelly beans would fit into a pint jar?
- How many Fridays are there during the current year?
- How many brown-eyed people are in the whole school?
- Is the number of Fridays always the same per year?
- How many times can they chew a bite of food?
- How many pennies do most adults carry in their pockets?
- How many pages are in the dictionary?
- How many times can they pat their feet in a minute, etc.?

B. Estimate, then calculate how many days it would take to travel from Raleigh to your hometown if you traveled 10 miles forward and 5 miles in reverse each day?

C. Divide the children into groups to discuss reasonable strategies for solving the following problems:

- What size box would you need to mail a skateboard?
- How would you measure the distance around an elephant?
- How much paper would you need to wrap your friend's birthday present?
- How would you find the weight of a bumblebee?
- How much water could your bathtub hold without overflowing?

Encourage the children to create other thought-provoking problems.

Notes and textbook references

D. Estimate how long it would take to walk from your hometown to some selected destination. Before giving their estimations, the students will need to have some general idea of how long it takes to walk a mile. The teacher may decide to have the students compute the exact time. If so, it would be necessary to measure the students' walking pace.

E. Which prize would you prefer, a million dollar jackpot or collecting $0.01, the first day and doubling the amounts each day for 30 days? (Day 1 = $0.01, day 2 = $0.02, day 3 = 0.04.)

5.6 Solve problems by observation and/or computation, using calculators and computers when appropriate.

A. Use a hundreds board to add any three numbers that are adjacent horizontally, vertically, or diagonally. Look for patterns in the sums of the three numbers. (Students should note that all sums are divisible by three.) Ask students if the pattern will apply if they add five adjacent numbers. Would this be the same for numbers on the calendar?

B. Use a calculator to find the product of the following equations. Look for a pattern in the products.

11 x 9 =
22 x 9 =
33 x 9 =
44 x 9 =
Using only the pattern, answer these problems:
66 x 9
77 x 9
What do you think would happen if you multiplied:
11 x 99
22 x 99
33 x 99
Check with your calculator.

Calculator Exploration

Write [illegible] problems in the following pattern: odd number divided by 2. What does the remainder in each case represent? Is this true for large numbers divided by 2?

C. Read The King's Chessboard by David Birch. Use a calculator to find out how many grains of rice the king must send to the peasant if he gives him one grain on the first day and doubles the amount each day.

D. Choose a number between 2 and 12. Key in the number you have chosen. Press [+] [=]. Continue to press the [=] key. Write down the number you get each time you punch [=]. Push [=] at least 10-12 times, then discuss the pattern.

E. Find out the number of seats in the Dean Dome in Chapel Hill. Can you find three towns whose entire population could go to a concert together?

5.7 *Verify and interpret results with respect to the original problem. Discuss alternate methods for solutions.*

Notes and textbook references

A. Give students a series of problems to work. Then give them clues to eliminate answers until they have one left to give them the information they need. For example:

632 -616	260 - 18	911 -819	573 -546	165 - 39
87 - 28	900 - 23	54 - 26	324 - 312	593 - 429

How long did the Wright brothers stay in the air on their first flight? The number of minutes was not:

a. 8 x 8
b. 10 more than 82
c. 2 sets of 10 plus 8
d. 5 tens and 9 ones
e. a palindromus number
f. more than 8 hundred
g. 12 tens and 4 ones
h. 4 x 4 or 3 x 9

B. Work with other faculty members to establish a problem solving shelf in your professional resources area. Good sources of ideas are the sample books sent for adoption review, *Superstars* (available through LEA central offices), and magazines such as *Zillions* and *Dynamath*.

5.8 *Formulate engaging problems including ones from every day situations.*

A. The Wright brothers first flew in North Carolina. Interview 10 adults. How many of them have flown? How would you write this as a fraction? What fraction of the group has not flown?

B. What is the maximum number of slices of pepperoni that will fit on a 10" pizza without overlapping? What questions need to be anwered for you to solve this? Find a solution.

C. Can you divide North Carolina into four congruent regions? Find a state in which you can.

D. North Carolineans drink more soft drinks than any other state. Find out the current estimated consumption and figure out how many cans of soda this would be.

Notes and textbook references

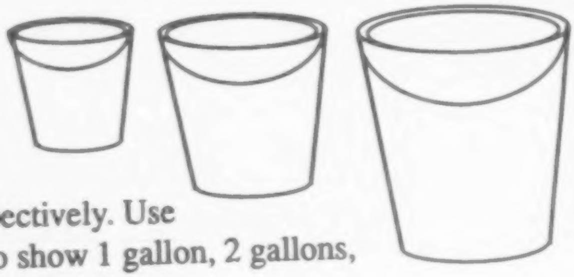
E. If you traveled 50 miles forward and 25 miles in reverse each day, how many days would it take you to go from Manteo to Murphy (about 543 miles?)

F. Which would you prefer to have, a milk carton (your cafeteria size) filled with quarters or two milk cartons of the same size filled with dimes? Explain your reasoning?

G. Obtain medium and large cups from several fast food places. Compare sizes and prices. Use beans to compare volume. Measure cups around rim. . . around bottom. . . length of side. . . how much they hold. . . how much they cost. . . Which one is the best buy and why?

JUST FOR FUN. . . .

1. Without using addition signs, arrange six "nines" so that they represent 100.



2. You have only three containers which have capacities of 3, 5, and 8 gallons respectively. Use these containers to show 1 gallon, 2 gallons, 3 gallons, . . . up to 16 gallons.

3. Use the digits 1 to 9 and addition and subtraction signs to write an expression worth 100.

4. You and your friend each have bags of marbles. One of you has 3 times as many marbles as the other. If you have 27 marbles, how many does your friend have? Is there more than one way to answer this question?

CLASS QUILT

INTEGRATING Strand 1 *NUMERATION*, Strand2 *GEOMETRY*, Strand 4 *MEASUREMENT*
with NORTH CAROLINA HISTORY

Get Ready

Have students measure and prepare two 4-inch dark construction paper squares and four 4-inch white construction paper squares for each student. The dark squares should be the same color for a student, but you can use a variety of colors in the class. Students will also need scissors and glue. Ask the librarian to help the class gather books about quilt making for students to do some research.

Get Going

Distribute paper squares and scissors. Direct students to fold one dark square in half, side to side, and cut on the fold (creating two rectangles). Put one half aside and arrange the other half on a white square to create a design that is one half white and one half a dark color. Note that at this point little variety in design is possible, but all students have a design that is half dark and half white.

Now direct students to fold their other half piece in half again by matching the two shorter ends and cut on the fold (creating two squares). Check to see if the students recognize that the small squares are each one-fourth of the larger white square. Have students arrange their two square pieces on a larger white square to create a design that is half dark and half white. Note that the design pieces must not overlap each other or go off the edge of the white square.

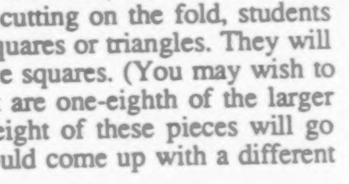
Have students to pick up the second dark square and fold in it in half, either side to side (creating rectangles) or corner to corner (creating triangles). After cutting on the fold, students should fold each of these half pieces a second time into congruent squares or triangles. They will have four dark design pieces to arrange on their remaining two white squares. (You may wish to allow students to cut these pieces in half again, creating pieces that are one-eighth of the larger white square. Be certain to allow time for students to verify that eight of these pieces will go together to comletely cover the large square.) Ask if each person could come up with a different arrangement.

Keep Going

Compare everyone's design to point out the great number of possibilities. Each student now glues down his/her one favorite design. Each student then needs to make 4 exact copies of his/her design. Using the four 4-inch squares, each student creates a larger 8 inch square design. (Have students measure and cut the squares.)

Students might be asked to consider how many arrangements of the four squares are possible in order to create different 8 inch designs. The answer to this question will vary according to the small 4 inch square design. If the 4 inch designs have rotational symmetry, there will be fewer possible different 8 inch designs. Ask students how they might keep track of all these designs in order to know that they have found all the possibilities and not repeated any? Glue all the 8 inch squares onto a large background paper (large fadeless paper for bulletin boards works) to create a class quilt that is half dark colors and half white.

You might take advantage of students' interest to now research quilting history, names of quilt blocks (students could name their own designs), different kinds of symmetry, names of polygons, etc.



The learner will demonstrate an understanding and use of graphing, probability, and statistics. 6

6.1 Collect, organize, and display data from surveys, research, and classroom experiments, including data collected over a period of time. Include data from other disciplines such as science, physical education, and social studies.

Notes and textbook references

A. While the wording is slightly different, Goal 6 in Mathematics is repeated in the Social Studies, Communication Skills, and Science curriculums. It is a natural way to integrate your lessons, choosing content from one area and teaching the processes as part of your mathematics class. Notice that objectives 6.1, 6.2, and 6.3 go together and are frequently accomplished in one extended activity.

B. Brainstorm types of information the students might want to display on the "We Love Calling North Carolina Home" bulletin board. Decide where to collect the data, how to organize and display the information. (Investigations could involve writing to historic/tourist spots across the state and collecting information about the number of visitors or they could be surveys about the typical number of miles people drive in a week or they could relate to popular eating spots.) You might have the students add an "Investigations" section where they could display their data.

C. Gathering data in a manner which makes the information easy to interpret necessitates asking good questions. Bring sample data displays from newspapers (*USA Today* is a good resource). What question did the researchers ask to gather the information for these graphs? Have students brainstorm information they would like to gather and how to write questions that will give them usable data. Be sure to discuss whatever guidelines they suggest. Divide the class into teams; have each team formulate a question and then gather the data based on their question. For example, students might decide to see if the most expensive binders are the most durable ones or are shampoos with conditioners better than plain shampoos?

Investigate the Consumer Reports for Kids entitled *__Zillions.__* *Write to: Subscription Department, P. O. Box 51777, Boulder, CO 80321-1777.*

Notes and textbook references

"Many of these ideas are elaborated upon in the integrated lesson plan section."

D. Conduct a census. Decide on questions to be asked, develop a format, and conduct the survey. Decide how to organize and display information gathered. You may decide to use the Student Census Sheet (see blackline master).

E. Use the following as sources for charts and graphs you provide for your students: *Guinness Book of World Records, North Carolina Almanac*, local newspapers, ingredient labels on cereal boxes, soup cans, and so on. Give students a chart or graph. Ask them to list the things they know based on the data. What might they conjecture?

F. Why are there only three telephone area codes in North Carolina? Can you name five states that have more? Are the digits 0 to 9 used with the same frequency in area codes? Are they used with equal frequency in residential phone numbers? in business numbers?

G. Have students create a personal timeline for a specific day (ex., last Wednesday), illustrating their activities throughout the day. Let students discuss and decide when their "day" (24 hour period) begins. ***Variation:*** Have students make a timeline of major events in their lives. Deciding where to locate things on the timeline is a good fraction activity.

H. How do you spend the 24 hours of your day? Have students decide upon categories and create a circle graph showing how they spend their days. All students do not have to use the same categories. Have students use different ways of dividing their circles into 24 parts. For example, some students might begin with a strip of grid paper 24 units long, color the hours by categories, and tape the strip into a circle. Using that ring, the students could then divide a circle they have drawn into the appropriate "pieces of pie". Or students might collect colored cubes to represent the hours in each category. They could arrange the cubes evenly around a circle they have drawn and use the cubes as a guide to dividing the circle. Another strategy might have students draw a large circle, cut it out and fold it in half three times. This would result in the circle being divided into 8 equal parts. Students could then estimate the division of each of the eight sections into three equal parts to make a circle with 24 equal divisions. (Students who have worked with Logo on the computer or have been introduced to a protractor may measure and divide the circles by using 360 degrees divided into 24 equal angles. This is not an appropriate method for many fourth graders, however.)

I. Create graphs by grouping North Carolina counties in different ways. For example, cut apart a map and group the counties by area as small, medium, and large. Next, group the counties by size in terms of population. Are the counties in the same groups? Graph them according to beginning letters. (Are there more counties which begin with the letter "A" than any other letter?)

J. Have students practice deciding how to label graphs by having them create bar graphs which need larger numbers. For example let students choose 5 or 6 large cities in North Carolina. Create a graph showing the populations. Then choose small towns. How would you change the scale to graph their populations?

K. When discussing the state symbols, have students brainstorm other possible state favorites. For example, students could design a question, perhaps limiting the choices, and survey 10 people each to choose a "State Dance."

Notes and textbook references

6.2 Formulate questions and interpret information orally and in writing including main idea, from charts, tables, tallies, and graphs (bar, line, stem and leaf, pictograph, circle).

A. Display and interpret data from activities in Objective 6.1. Have students write about a data activity as homework or in their math journals.

B. Have students list all information they can learn from a specific chart or graph. Have them design questions. Refer to "Asking Questions" in Teacher-to-Teacher section.

C. Compare data from your partner classroom (see "We Like Calling North Carolina Home" project #2). If you decide not to correspond with a classroom in another part of the state, consider working with another teacher in your school to compare data. Have students write one or two students to summarize what they notice in comparing data.

D. Suggest characters from folk tales, North Carolina history, or people in the community and continue the circle graph activity (6.1 G) estimating how they spent their days. For example, Blackbeard might have slept 7 hours, eaten for 2 hours, gone fishing 4 hours, worked on burying his treasure for 5 hours, practiced with his sword and pistol for 2 hours, and sailed around for 4 hours. Students could create "mystery" personalities to be guessed by reading the circle graphs.

E. Cut out daily weather maps from a local newspaper. Have students discuss temperatures and temperature changes. Save maps and make monthly comparisons. Compare daily temperatures in different cities across the nation and discuss both in written and oral form. Discuss how you would dress in different cities.

F. Watch or listen to the news. Write down the high and low temperatures in the United States. Compare them with our own high and low temperatures. What can you say about weather in different parts of the country?

Use forms such as "What Do We Think" at the end of this section to help students organize their initial surveys.

G. If there is an older cemetery nearby, have part of the students record the ages of people at their deaths. You may wish to focus on the years only since subtracting with years and months is difficult. Allow them to graph their data. Have a second group of students collect data from current newspaper obituaries and graph that information. What comments can you make about each set of data?

6.3 *As a group, display the same data in a variety of ways; discuss advantages and disadvantages of each form, including ease of creation and purpose of the graph.*

Notes and textbook references

A. Divide your class into several cooperative groups. Let each group collect data about a favorite North Carolina sports team. What will be possible resources for information? Each group should display its information in a couple of different graphs, i.e., circle bar, line plot, etc. The class can discuss advantages and disadvantages of each form. ***Variation:*** Gather and graph data from a local team throughout a season.

B. Select a graph or chart from your social studies book. Use this information to create a new graph format. Discuss the advantage or disadvantage of the new graph format as compared to other forms.

C. Using old newspapers, magazines, and books, collect and compile a variety of graphs and charts. Discuss the advantages and disadvantages of each type. Do you notice any efforts to influence your thinking in the way data is used in advertising?

D. Identify the counties in each of the three (or four if this is your preference) regions of North Carolina. Have different groups represent this data with different data displays. After each group presents their display, have the students discuss advantages and disadvantages of each format.

E. Have students determine prices of the same favorite foods from three different stores. Ask them to figure out how to best display the information so that they could make some statements about the costs of shopping at each of the stores.

6.4 *Explore range, median, and mode as ways of describing a set of data.*

A. Find the median height of the students in your class. Then find the median height of the players of your favorite basketball team. Use the median to compare your class to your favorite team. Why would the median be a good way to compare the groups? How do the results of your investigation differ if you confine the mode in each of these situations? Do you think the mode would be a more informative comparison?

B. Conduct a timed run for each student. (Use fitness testing information). Find the range, median, and mode for the class. ***Extension:*** Collect same information from students in younger and older classes and compare the data.

Notes and textbook references

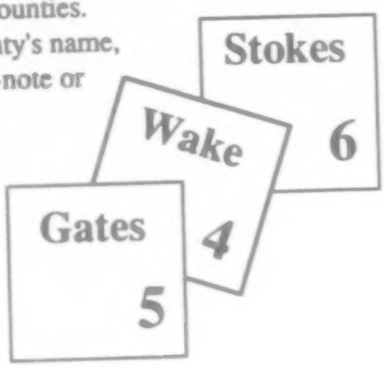
C. Have students gather absentee information by grade level for a week. Determine range, median, and mode for each grade for each day and each grade level for the week. Analyze and compare the information. Repeat the activity several other weeks. Are the numbers similar? If they are very different, what statements might you make?

D. North Carolina students report, according the the National Assessment of Educational Progress (NAEP), that they spend less time doing homework and more time watching television than students in most other states. Survey students in the fourth grade to determine how many minutes of homework they usually do. At the same time, gather information about the number of minutes spent watching televsion. Your class will need to decide how they want to gather the data: specific records from a two week period, students' estimates, specific data from a set night, etc. An important part of dealing with data is making this kind of decision and recognizing how the manner in which you gather information may influence your outcomes. Do plan to spend time allowing students to talk about these issues rather than making the decisions for them. Stem and leaf plots may be helpful in looking at the data, or your students may decide that they find other ways to organize more meaningful. What questions might you explore with this data?

E. Given a graph of climate data, such as the temperatures of several North Carolina cities (graphs can be found in textbooks), have students determine the range, median and mode of the temperatures.

F. Have pairs of students cover a sheet of paper with a pattern block design. They should cover the entire surface. (Some edges may show.) Create six different graphs showing the number of each kind of pattern block used by the class. Using the graphs, discuss the range, median, and mode for each piece. ***Extension:*** Suppose you and your partner were responsible for putting together pattern block sets. Each set is to have 100 pieces. How many of each piece would you put in the set? With your partner, decide on the composition of the sets and prepare a brief presentation to convince your classmates that your set would be the best one.

G. Divide class into 10 groups. Give each group a list of the names of 10 different North Carolina counties. Students count the number of letters in each county's name, and then record each individual total on a post-it-note or paper square with the name of the county. Next, create a bar graph by taping the names and numbers in the appropriate column.



6.5 Name the ordered pair of a point on a grid; plot positions named by ordered pairs on a coordinate grid.

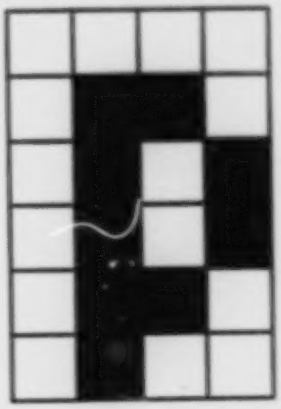
Notes and textbook references

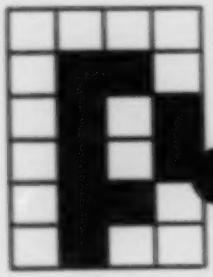
Be certain to look at page 59 in the Strategies for Instruction in Mathematics for Grade 3. Note the coordinate lessons in the integrated plans.

A. Use activities such as the Appalachian Mountain Folks Fun Sheet to have students review coordinates. (See blackline masters.)

B. Have students use a North Carolina map containing bodies of water. Draw a grid on the map labeling the squares with letters and numbers along each axis. Let children use a combination of the coordinates on the grid and a compass rose to follow clues on an index card which will help them locate the coordinates of the body of water.

C. Know your state. Divide students into groups. Give each group a state map. Discuss how this map has the spaces named by numbers and letter rather than naming the lines. Working as a team have students use map grids to locate points of interest and record the coordinates. Use this information to create an index for the map.





D. Have students work cooperatively to complete a drawing on a 8 x 8 grid. Drawings could include: a lighthouse, other state symbols, map of North Carolina, tarheel, etc. Label lines of the grid as coordinate points. Give students a larger piece of paper (students could even use pieces of bulletin board paper) and have them to fold it in half each way three times (to make an 8 x 8 grid of fold lines). Tell students to number the lines on their original drawings and corresponding lines on the larger paper. Using the coordinates and squares on the grid as guides, let the students enlarge their pictures.

E. Using the grid from the Appalachian Mountain Folks Fun Sheet (see blackline masters), provide students with a list of coordinate clues that results in the spelling of North Carolina counties:

B	**U**	**R**	**K**	**E**
(5, 6)	**(2, 8)**	**(6, 7)**	**(1, 3)**	**(1, 1)**

Variation: Have students create Coordinate Clues using names of counties to share with a friend.

Notes and textbook references

F. On a full page outline map of North Carolina, have students measure to create a coordinate grid. (For example, space lines one centimeter apart and then label the *x*-axis and *y*-axis.) In groups of three or four students, have a leader choose a spot to "bury a treasure." Other students try to guess the site using coordinates. The leader should give clues such as "Go north and east" or "You are too far south and east." When the treasure is identified, the leader changes. (See the game "Hurkle" in Family Math.)

6.6 Use ordered pairs in a variety of engaging situations (e.g., map reading, treasure hunts, games, and designs.)

A. Give each student a copy of a coordinate grid with letters of the alphabet at various intersections. Write a secret message for students using the ordered pairs.

B. Have students use graph paper to make their own secret word coordinate graphs using state symbols. Have them label points on the graph with all alphabet letters, and write ordered pairs for each letter of their hidden North Carolina symbol.

C. **Coordinate Dice:** Give a pair of students a grid with the lines numbered 0 to 6. Each person rolls a die. The highest roller goes first. Using a green die for the *x*-coordinate and a red die for the *y*-coordinate, player 1 rolls the two dice and places his/her color token on the grid according to the coordinates. The first person with three tokens in a row wins.

D. Use commercial games and software such as "Battleship", "Bumble Plot", "Gertrude's Puzzles", and "Hurkle".

E. Put masking tape on 2 sides of a geoboard to label rows and columns. Students work in pairs. Each student has a geoboard. Students take turns hiding a "fruit loop" or other ring on a peg. Students take turns guessing coordinate points to find opponents' "fruit loops." Students must give clues based on the Compass Rose (move Southeast, Northwest.)

F. Have students create a coordinate scavenger hunt. Use a North Carolina road map to write clues. For example:

1. A town named for an animal in the center of J3 **(Turkey)**
2. A town that is a girl's name on the border between D2 and D3 **(Ruth)**

The preceding activities have used ordered pairs to locate positions on a grid. A mathematical use of ordered pairs which students begin to explore in grade 4 and will use frequently in future grades is functions. A function is a relationship in which one number in a given set of numbers is paired with exactly one number in a second set of numbers. Refer to the activities in 3.5 and 3.6.

6.7 Show all possible ways to sequence a given set of objects; list and explain all possible outcomes in a given situation.

Notes and textbook references

A. Select 10 North Carolina cities from all three regions. Sequence these cities:

1. alphabetically
2. by altitude
3. by population, smallest to largest
4. by population, largest to smallest
5. by date of incorporation

Compare and discuss the different groups.

B. Have students take twelve counters and show all possible ways to arrange them onto two squares of white paper. Suppose you arranged the twelve counters onto three squares. (For this activity 2 + 3 + 5 is a similar grouping to 5 + 3 + 2 and is not counted again.)

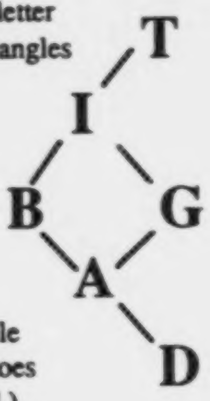
Read Do You Wanna Bet? by Jean Cushman. Danny and Brian discover that you are likely to predict an outcome if you know something about probability. Each of the eight chapters has investigations for the class to try.

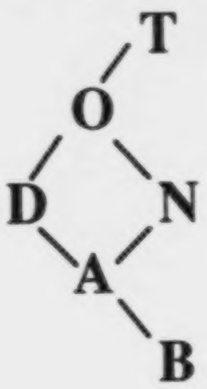
C. Suppose you are designing a border for your North Carolina bulletin board. Using some of the North Carolina symbols placed in a row, determine the number of possible arrangements if:

- two symbols are chosen
- three symbols are chosen
- four symbols are chosen

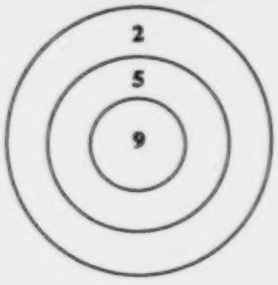
Begin to make predictions about the number of possible arrangements if more symbols are used.

D. How many different three-letter words can you form when you read the triangles (tree diagrams) from left to right? Help students to write the words from these examples and then have students create other triangles.





E. Draw a large bull's eye as shown. Tell students that 3 darts hit this target. How many different possible scores could the player have earned? (It does not mattern in what order the darts landed.) Make an organized list of the possible totals.



Note that an activity such as this is a good way for students to practice simple addition.

The learner will compute with rational numbers.

7

7.1 Estimate results and solve meaningful problems involving addition and subtraction of multi-digit numbers, including those with two or three zeros. Use a calculator in situations involving large numbers (more than 4 digits) or more than 3 addends.

Notes and textbook references

A. Have students work in groups to first estimate and then make a plan and to determine "how many?" (Example: How many words are on this newspaper page? How many books are in our classroom?

B. Using the following calculator keys, challenge students to find as many different equations to equal 100 as possible. These keys may be used more than once:

$\boxed{7}$ $\boxed{3}$ $\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{\div}$ $\boxed{=}$

C. Provide each student (or pair of students) with a hundreds board, markers (such as Unifix cubes or two color counters), and a calculator. Students will place marker on the number that corresponds to the clue that you give. (Some clues may require calculators, while others can be done mentally.)

Clues: "Place a marker on the number that equals. . ."

a. 142 - 100 (42)
b. 200 - 155 (45)
c. 300 - 253 (47)
d. 148 - 100 (48)
e. 10 + 20 + 10 + 9 (49)
f. 10 + 30 + 12 (52)
g. 4000 - 3947 (53)
h. 20 + 20 + 20 + 4 (64)
i. 50 + 12 (62)
j. 60 + 12 (72)
k. 100 - 27 (75)
l. 100 - 35 (65)
m. 100 - 45 (55)
n. 50 + 10 + 10 + 9 (79)
o. 1000 - 922 (78)
p. (60 + 20) - 3 (77)
q. (50 + 22) - 5 (67)
r. (100 - 50) + 7 (57)

Result: Initials of North Carolina (NC)

Use numbers from the school to create computation questions: "Were more students absent on Mondays or Fridays during this grading period?" or "How many lunches does our cafeteria serve in one week?"

Notes and textbook references

D. Provide a copy of the chart and a calculator to students. Then ask them questions similar to those below the chart.

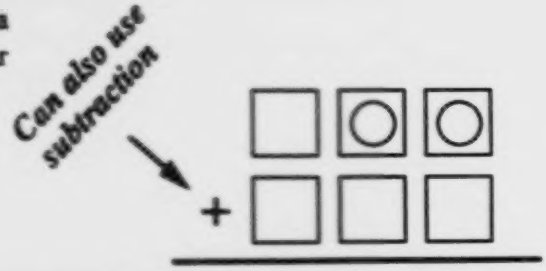
Mountain Peaks of North Carolina

Mountain	Height (feet)
Grandfather Mountain	5,964
Mt. Mitchell	6,684
Mt. Sterling	5,835
Mt. Hardison	6,134

1. How much taller is Mt. Mitchell than Mt. Sterling?
2. If you climbed Mt. Hardison and Grandfather Mountain, how many total feet would you have climbed?
3. List the mountains you climbed if you climbed 29, 732 feet in all. List the mountains you climbed if you climbed 11, 959 feet in all.

Allow students to create their own questions.

E. Provide students with a die and a format similar to the this example.



Students roll die to generate numbers for the empty squares. Then, students perform desired operation. *Note:* When you use subtraction, add one additional box in the top row so that students are subtracting a 3-digit number from a 4-digit number.

F. Giving each student a hundred board and chips, the teacher then calls out a set of problems such as: 7 + 5, 56 - 1, 50 + 3, etc. or any arithmetic operation desired. The students mentally compute, then place a chip on the correct answer. When complete, the student should have formed a picture or design on their board. Direct students to make a design or picture and write out the computations that would produce the design for the class. Students can then take turns playing the game with partners or small groups.

G. Using their social studies book and other sources, have students find and compute the area of the three largest counties, the area of the three smallest counties, the population of the three largest counties, etc.

H. Have students collect the last four digits of the telephone numbers of 10 friends. Have them subtract these numbers from 9105. Is there anyone whose number cannot be subtracted?

7.2 Use mental math skills to approximate answers and to solve problems, using strategies such as estimation and clustering.

Notes and textbook references

A. Allow students a budget of $500.00. In cooperative pairs, have students purchase between 8 and 12 items from a catalog staying within the $500.00 budget. Students may use a calculator to keep a running total of their purchases, estimating each purchase to the nearest dollar. Each pair of students should prepare a written report with exact amounts when they have decided on all purchases.

B. Using individual sets of one-inch tiles with the numerals 0-9, ask students to show an estimated answer before they calculate problems in their texts.

C. Use a variety of fun estimation problems such as the following:

- Are there more toothpicks in one handful or in three boxes of toothpicks?
- Which has a greater value: a stack of dimes three inches tall or quarters laid side by side in a row five inches long?
- Which would be greater, the number of miles driven by the school buses to bring students to your class or the number of miles your parents drive to work?
- Which is more, the number of groups of 10 in 1993 or the number of groups of 10 you could make with a large bag of M & M's?

Play the "License Plate" game. Directions are in the blackline masters.

D. How many kernels of unpopped popcorn are in one level measuring cup? How much popped corn does this one cup equal? (First, estimate your answers, then check your answers.)

E. Give students sets of numbers, with 8 or 9 numbers in each. Have students work in pairs to discuss how they might group the numbers to make their addition easier. Take time for pairs to explain their thinking to the class. Encourage students to verbalize their own strategies for mentally computing.

Set A:
16 + 12 + 9 + 3 + 8 + 6 + 11 + 4 =
"These might be grouped as
(16 + 4) + (9 + 11) + (12 + 8) + (3 + 6)
so I would add 20 + 20 + 20 + 9."

F. Demonstrate for students the difference in "front-end" estimation and rounding. Have them talk about the adjustments you need to make when you use front-end as a strategy.

G. Give students a problem such as 36 + 25. Ask them to talk with a partner to find several ways to find the solution. Have them share with the class.

"I added 30 + 20 and then 6 + 5. It was easy to add 50 + 11."
"I added 36 + 20, which is 56. Then I added 56 and 5."
"I added 36 + 30. Then I subtracted 66 - 5."

Notes and textbook references

H. Give students the number of students present in the fourth grade for each of the last five days. Help them decide how to "cluster" the numbers for an easy multiplication estimate. For example:

Monday = 72
Tuesday = 75
Wednesday = 79
Thursday = 78
Friday = 71

About 5 x 75 students were present.

7.3 Explain multiplication through the use of various models or by giving realistic examples.

A. Working in pairs with centimeter grid paper, scissors, and tape, students will construct a bulletin board display posting all the possible rectangular arrays for numbers from 1-25. Use the display as a teaching tool, asking the students to look for patterns.

B. Working in small groups with 11 multiplication charts, students will color in the multiples of numbers from 2 to 12 (one number per chart). Students will then arrange the charts on a poster board and discuss the patterns made by different numbers.

C. Provide boxes or bags of small object that students can arrange in rows or in equal groups. You might use:

- 18 toothpicks
- 36 paper clips
- 17 cards
- 6 buttons
- 24 blocks
- 25 Unifix cubes
- 10 pattern blocks
- 12 counters
- 9 tiles

Have students arrange the objects in rows containing the same number of objects. They should record their arrangements. Ask students to make as many different arrangements as possible.

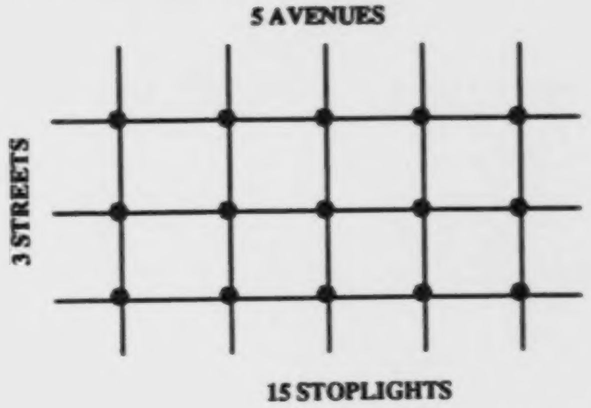
D. Use a variety of manipulatives to explore multiplication. For example, Unifix cubes can be stacked in sets. (They can also be worn on fingers!) Goldfish crackers may be grouped in schools on a blue construction paper pond. Strips of equal length paper can be laid end to end. (A two-inch strip + two-inch strip + two-inch strip = six-inch strip. Glue the strips and write the equations • 2 inches + 2 inches + 2 inches = 6 inches or 3 x 2 = 6.) Use chips or cubes in an egg carton to model multiplication. Put equal sets of seeds in little cups to show multiplication.

E. Play the circles and stars game. Make a booklet using pages that are 1/4 the size of notebook paper. Roll a die and draw that many circles. Roll a die the second time and draw that many stars inside each circle. Write the resulting multiplication fact. Put each turn in a separate page.

F. Model multiplication as repeated addition by having students "add to" a pile of cubes or other objects that you begin. For example, on the overhead display four toothpicks. A student will add another group of four (4 + 4). Then another student adds four more (4 + 4 + 4), etc.

Notes and textbook references

G. Use streets and avenues to model multiplication - as students figure the number of stoplights needed for the intersections.

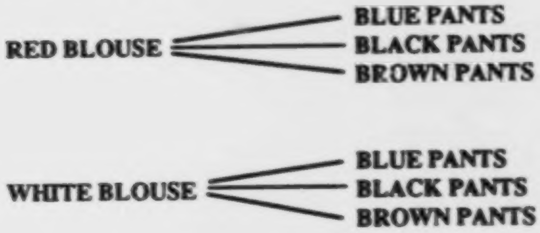

5 AVENUES
3 STREETS
15 STOPLIGHTS

3 x 5 = 15

This is an array model for multiplication.

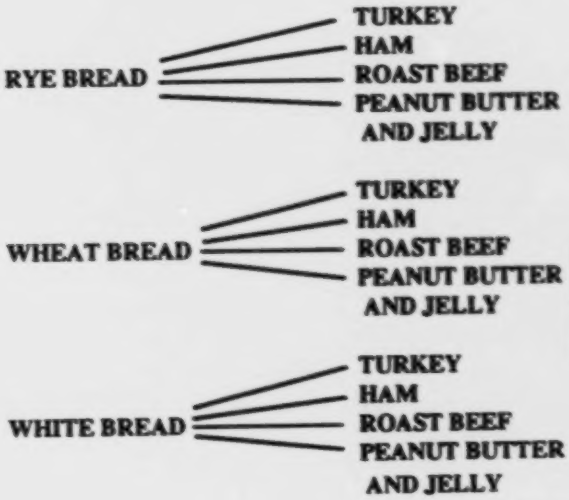
H. Relate situations such as these to tree diagrams and multiplication:

How many possible outfits?


RED BLOUSE
BLUE PANTS
BLACK PANTS
BROWN PANTS
WHITE BLOUSE
BLUE PANTS
BLACK PANTS
BROWN PANTS

2 x 3 = 6
OUTFITS

How many possible sandwiches?


TURKEY
HAM
RYE BREAD
ROAST BEEF
PEANUT BUTTER AND JELLY
TURKEY
HAM
WHEAT BREAD
ROAST BEEF
PEANUT BUTTER AND JELLY
TURKEY
HAM
WHITE BREAD
ROAST BEEF
PEANUT BUTTER AND JELLY

This model shows multiplication defined in terms of Cartesian products.

3 x 4 = 12
SANDWICHES

7.4 Model and explain division in a variety of ways such as sharing equally, repeated subtraction, and rectangular arrays.

Notes and textbook references

A. For each group of eight students, prepare bags with different numbers of beans so that each child will model 10 division problems. Give students bags of beans and four cups. Have students divide the beans equally among the cups. They should chart findings and note "left-overs." Repeat until each student uses each bag. When all groups are finished, have students share their results and look for patterns.

B. Using numeration blocks (units, tens, hundreds) and the place value mats, have students do examples of division problems with one digit divisors and no remainders. Allow students to actually build the numbers and subtract the blocks.

C. One person uses a calculator to enter a number. The student then subtracts a given number, such as 4, until zero is reached. A partner keeps a record of the number of times it is subtracted.

Examples: Enter 36 and subtract fours.
Enter 20 and subtract fives.
Enter 18 and subtract sixes.
Enter 50 and subtract tens.

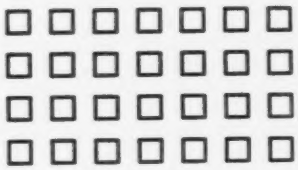
Writing prompt: How do the numbers you start with, the number you subtracted, and the number of times you subtracted it relate to multiplication facts?

D. Supply students with counters (beans, Unifix cubes, ones cubes, etc.) and pieces of yarn. Have students illustrate division problems like the following examples in two ways. Have students make up stories that they can illustrate.

15 ÷ 5 = 3 **20 ÷ 4 = 5** **14 ÷ 2 = 7**

E. Relate multiplication and division. Model the following problem for students using cubes or tiles by building a rectangular array:

Problem: 24 ÷ 4
Step 1: Count 24 tiles.
Step 2: Make the left side with 4 tiles since that is a factor which you know.
Step 3: Use the tiles to continue to build a rectangle with the left side of 4 and the number of columns being gradually revealed.
Solution: 24 ÷ 4 = 6.



Model similarly 27 ÷ 4, showing that there will be 3 left-over tiles since the directions are to always build rectangles. Give pairs of students 30 tiles and have then work together to model these problems as rectangular arrays. Ask them to record their solutions in pictures and words/symbols.

15 ÷ 3 **28 ÷ 7** **18 ÷ 4** **23 ÷ 5** **21 ÷ 3**

Notes and textbook references

F. Use a hundreds board to model division facts as repeated subtraction. For example: 42 ÷ 6. Put a marker on 42. Count back 6 and put a marker. Count back 6 (subtract 6) and put another marker. Continue until markers cover 42, 36, 30, 24, 18, 12, 6. The number of markers (7) shows how many times you can subtract 6. They show the number of groups of 6 and relate the process to multiplication and repeated addition. Have students try other facts: 54 ÷ 9, 27 ÷ 3, or 49 ÷ 7.

7.5 Memorize multiplication facts and relate to division facts.

A. Use multiplication facts to play "Multiplication Bingo." You can use regular bingo cards to call out facts and have students cover answers. Special bingo cards can also be made to reinforce facts.

B. Use the multiplication drill games in the Week-by-Week Essentials. They can be placed in a center for free time activities or students can keep copies at their desks after the class learns the current game of the week.

Plan a family fun facts night. See information in the "Week by Week Essentials" section.

C. Have students work in pairs to play "Multiplication Concentration". Use a set of flash cards with multiplication facts. Turn them face down. Have students match factors with products.

D. Organize a multiplication baseball game. Divide students into two teams. "Batter" may choose to try for a

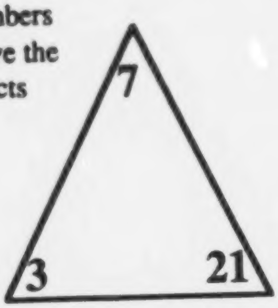
Single - one multiplication fact
Double - two multiplication facts
Triple - three multiplication facts
Homerun - four multiplication facts

If the "batter" answers correctly, they proceed to the proper base. If the answer is incorrect, the "batter" is out. Follow regular baseball rules for innings and outs. (Student can prepare problems the day before the game.)

E. Have students make any design they choose on their hundred boards with chips. Then ask them to write a series of multiplication or division facts to form that picture. Direct students to exchange puzzle directions with other members of the class.

F. Show students a triangular card with three numbers corresponding to a multiplication fact. Using the card, have the students write two multiplication facts and two division facts based on the numbers given.

7 x 3 = 21 21 ÷ 3 = 7
3 x 7 = 21 21 ÷ 7 = 3



Allow students to make triangular flash cards for their harder facts.

G. Create a data bank. As students study multiplication tables, have them list things that come by two's (eyes, hands, twins), by three's (sides of triangles, three pigs). Put these on charts and encourage students to use the data to create story problems.

H. Students play with a partner to practice a multiplication table. For example, if practicing fives, write 5 on a piece of paper or use a number tile. In turn, students will roll a (0-9) die. If first student rolls a 6 then the student will multiply and record. Person with largest number circles the product. After 10 rolls, person with most circled numbers wins game. (If 0-9 die is not available, draw digit cards.)

See the multiplication puzzle in the blackline masters.

I. Prepare a class game for the overhead (or on a large poster). Draw or cut out pictures of toys and assign different prices to each: For example, a football might cost $7, a baseball $3, a bat $5, a soccer ball $6, a jump rope $2, and a large rubber ball $4. On a 5 x 5 inch grid, put a variety of prices, all greater than the highest price toy. Prices might range from $8 to $32. The object of the game will be for a team to cover four prices in a row. In order to earn the right to cover a price, a player must state what can be bought that will total that price. For example, a student could buy three soccer balls and a jump rope and cover $20.

K. Buzz is a class game used to practice multiplication tables. You name a table you want the class to practice. For example; x5. Children stand next to their chairs. The first person says 1, the next 2 and so on. When it is time for the fifth person to name the number, the student must say "buzz" to replace the numeral 5. If the student forgets and says "five", the student sits down. Each time a player is to say a multiple in the practice table, the student must say "buzz" or be seated. Winners are those left standing at the end of the game.

L. On a hundred board, color the following squares black to find a North Carolina picture

1.	(9 x 10) + 7	(97)
2.	(8 x 10) + 7	(87)
3.	(8 x 11) + 5	(93)
4.	(7 x 10) + 16	(86)
5.	(5 x 10) + 44	(94)
6.	(9 x 9) + 2	(83)
7.	(5 x 9) + 50	(95)
8.	(8 x 10) + 5	(85)
9.	(8 x 8) + 20	(84)
10.	8 x 8	(64)
11.	6 x 11	(66)
12.	(6 x 10) + 5	(65)
13.	4 x 11	(44)
14.	(5 x 9) +1	(46)
15.	(5 x 9)	(45)
16.	(2 x 10) - 15 or (2 x 5) - 5	(5)
17.	(5 x 5	(25)
18.	(2 x 10) + 6	(26)
19.	3 x 9	(27)
20.	(2 x 5) + 13	(23)
21.	6 x 4	(24)

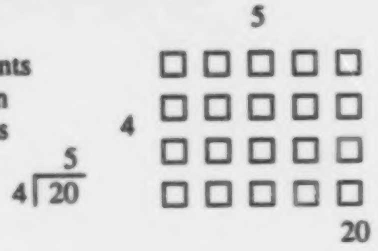
22. Make a diagonal line from the top right to bottom left on the number that equals (3 x 9) + 10.
23. Make a diagonal line from the top left to the bottom right on the number that equals 11 x 3.

24-26. Color these yellow: 3 x 5, 2 x 7, 8 x 2

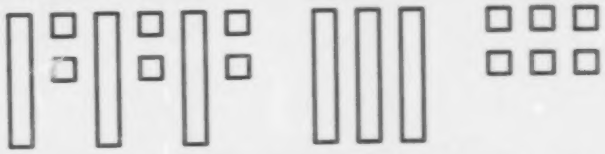
7.6 Demonstrate with models special properties of multiplication: commutative, associative, and identity; and the relationship of multiplication and division.

Notes and textbook references

A. Provide graph paper or tiles for students to make rectangles whose sides are the factors in multiplication. Have students write the results as illustrated. Note the relationship to the way division problems are written.



B. Use base 10 blocks to model 3 times different numbers. Have students explore different ways to group the blocks. For example, 3 x 12 may be modeled as (3 x 10) + (3 x 2).



Ask students to model and discuss alternate groupings for each example, writing the appropriate expressions, for these situations:

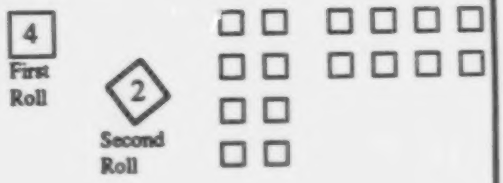
3 x 14   3 x 37   3 x 123   3 x 41   3 x 115.

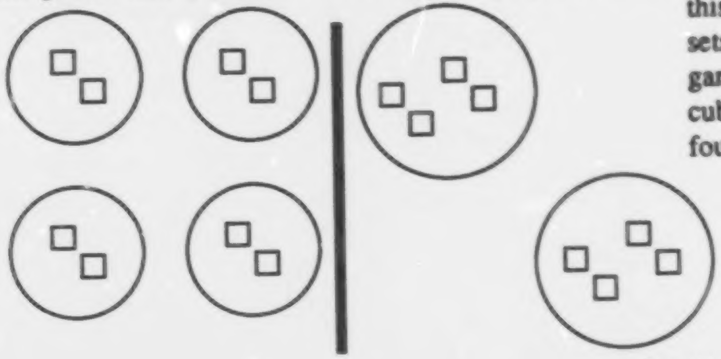
C. Use blocks, tiles, or paper squares to model expressions such as these:

(2 x 3) + (2 x 2) = 2 x (3 + 2) and 6 x 1 = 1 x 6
(3 x 4) x 2 = 3 x (4 x 2) and 48 x 1 = 1 x 48

After you model on the overhead, have students do similar problems with manipulatives at their desks.

D. With manipulatives on a piece of overhead film, let students take turns rolling a die twice and building the corresponding array, labeling the sides. Then rotate the paper one quarter turn to model the commutative property. Have the student also model this by first making 4 sets of two then reorganizing the game cubes to be 2 sets of four.





7.7 Estimate results; then solve meaningful problems using the multiplication algorithm with 1-digit times 1- to 3-digits and two 2-digit numbers where one is a multiple of 10.

Notes and textbook references

A. Copy a menu from a local restaurant, make a poster with fast food prices, or create an overhead which gives food prices. Have students figure the costs for food in the following situations:

In each of the menu tasks, ask students to estimate if the amount needed would be more or less than $8.00.

- order 3 of the same sandwich
- 2 people order the same sandwich and large drink
- 5 people order the same size drink
- 4 orders of the same sandwich, drink and small fries

Big Burger	**$2.39**
Chicken Delight	**$2.65**
Baby Burger	**$ .74**
Golden Fries	**$ .83**
Large Drink	**$ .99**
Small Drink	**$ .75**

Note: *Since students are not yet formally multiplying with decimals, they should decide where the decimal goes by using logical thinking and relating multiplication to repeated addition. For example, would 6 Baby Burgers cost $444.00, $44.00, or $4.44 or $.44?*

B. Suppose the following characters and their friends came to lunch in your school cafeteria. What would the cost of a regular lunch for these groups?

Paul Bunyan and Babe
The Three Little Pigs
Charlotte and nine baby spiders

Snow White and the Seven Dwarfs
Ramona and four friends
Lon PoPo, her two sisters and mom

C. When you use pages of drill in the textbook, give students a variety of assignments which encourage estimation and logical thinking. For example:

Since modeling large numbers such as 30 x 25 is difficult, be certain that students have opportunities to develop a strong sense of number so that they can evaluate the reasonableness of their answers.

- Work only the problems which will have odd numbers as the product.
- Work only the problems which will have products greater than 100 (or another appropriate number).
- Work only the problems whose answers are between 500 and 900.
- Work only the problems in which the number in the tens place of the answer will be less than 6.
- Work only the problems which will have products less than 100.

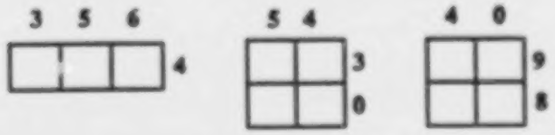
For additional ideas see "Drill Without Drudgery" in the Teacher to Teacher section.

Notes and textbook references

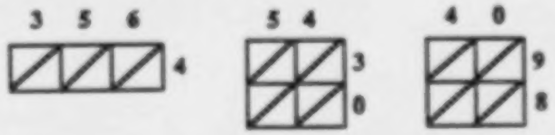
D. Use lattice multiplication to practice basic facts and introduce multi-digit multiplication. (Napier's Bones)

Step 1: Place numbers outside a grid as illustrated.

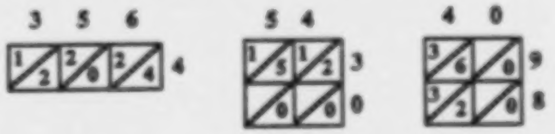
356 x 4 54 x 30 40 x 98


3 5 6
4
5 4
3
0
4 0
9
8

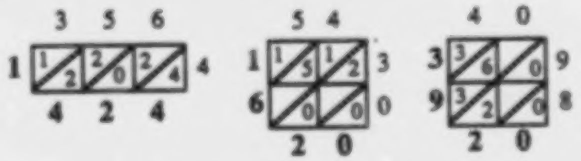
Step 2: Draw the diagonals as illustrated.


3 5 6
4
5 4
3
0
4 0
9
8

Step 3: Multiply (basic facts) putting ones digits of products in lower part of box and tens digits in upper part.

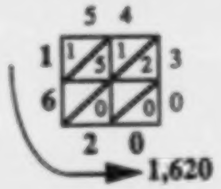

3 5 6
1 2
2 0
2 4
4
5 4
1 5
1 2
0
0
3
0
4 0
3 6
0
3 2
0
9
8

Step 4: Add the numbers along the diagonals.


3 5 6
1
4 2 4
4
5 4
1
6
2 0
3
0
4 0
3
9
2 0
9
8

Step 5: Read product from left to right and around the corner.

Example:


5 4
1
6
3
0
2 0
1,620

Notice that this process will work for problems with factors of any size.

7.8 Solve division problems with single-digit divisors and no renaming.

Notes and textbook references

A. Read *The Doorbell Rang* by Pat Hutchins. Write a number sentence for each problem.

B. How many cookies can be shared equally among 2, 3, 4, 5 and 6 people. What patterns do you see? Do some numbers appear on more than one list? ***Example:*** What if the bag of cookies contains 12, 48, or 96 cookies?

Many stories lend themselves as "starters" for problem solving. The Millionth Egg, for example, has a party being planned in addition to obvious computational opportunities.

C. If you have 24 animals and you need to put them into pens so that each pen has the same number of animals, how many pens with how many animals could you have? Is there another way to arrange the animals?

D. When practicing the division algorithm, have students use the divisor of 5 since they can use their knowledge of money to help them predict a reasonable answer.

E. Read Majorie Sharmut's *The 329th Friend.* How many tables for 3 and tables for 8 will Emery need for his guests? What other mathematical investigations

7.9. Estimate results; then use calculators and computers to solve problems involving multiple-digit numbers.

A. Assign a specified amount of money to each student, then display on the board or overhead pictures of items and their prices. (Give a wide range of prices for the items). Students take turns representing their team and naming items they think will be close to their target amount without going over. They should not do the actual arithmetic until after time is called and the students closest to the total are recognized. Allow students to use calculators at this point. This activity should be repeated many times with many different target amounts to spend and different items to buy.

Standardized tests have many questions which ask students to figure meal costs and find their change.

B. Use menus from local restaurants or have the class make one. Give a fixed amount such as $5.00 for lunch and have students select from the menu. Estimate the total meal cost. Estimates can be checked with a calculator. (You can introduce tax tables rather than compute sales tax.)

C. Give students questions with computations where they don't have the time to compute but must make judgements based on estimation. Later, give students time to check and verbally justify their answers to a partner. This is a good activity for the overhead. For example, "Would 250 be a good estimate for 24 x 9?" or "If I add $4.25, $8.69, and $6.85, will my total be more or less than $20.00?"

D. Put a chart with populations of North Carolina cities on the overhead. Ask students to estimate which two or three cities together would have populations of a certain amount. Move quickly so that students learn to estimate rather than take time to compute.

7.10 Estimate and use models and pictures to add and subtract decimals, explaining the processes and recording results.

Notes and textbook references

A. Provide students with a blank decimal square or blank hundreds board. Color your first and last initials on the decimal square. Determine the worth of the first initial in decimal form. Next, determine worth of last initial in decimal form. Finally, add the decimal amounts to tell what part of the square is colored.

B. Use the decimal models students made in 1.7D. Place the cards face down in a deck. Students can play in pairs to "battle" for the squares. At each turn, the students draw 2 decimal models, add their own amounts, and decide which player has the larger total. The person with the larger sum wins all 4 cards.

C. Use cut out decimal models to help students see that .7 + .5 will result in a whole with .2 additional.

Students should work on multiplication and division facts for the entire year as they are involved in a broad variety of mathematical investigations. Each child should compete against himself or herself (not other children) to improve on accuracy and speed. What is most important is that students fully understand the concepts and can model the processes in many different ways.

Knowledge of number facts is the foundation of estimation skills and the ability to judge if the results of computation are reasonable. Games and activities to help students learn facts are to be found throughout this book.

Strategies to Extend Student Thinking

* Let students know that you value alternative and unique solutions.

* Use "wait time" to provide students thinking time after you pose a question.

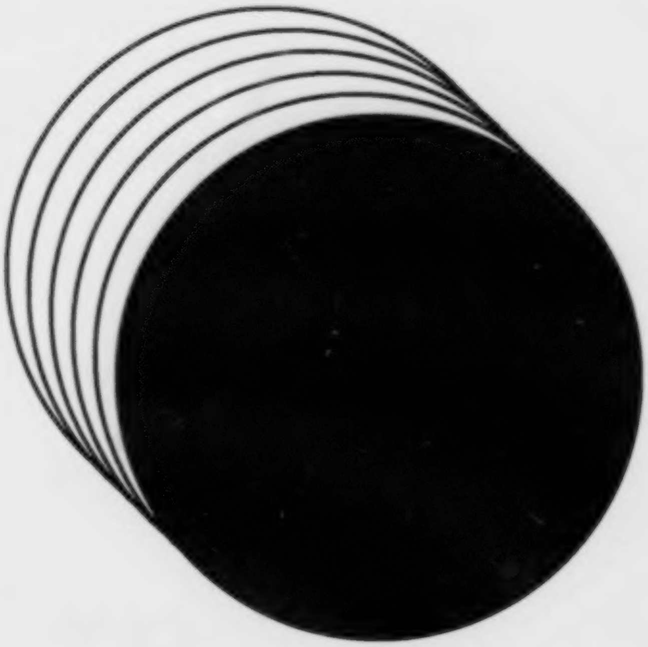
* Encourage all students to express their opinions, both agreeing and disagreeing with statements:

- "Thumbs up if you agree; thumbs down if you disagree."
- "Tell me more."
- "Why do you say that?"
- "Tell your partner before we talk as a class."
- "Do you agree with this response? Can you tell us more. Give us an example."

* Have a student rather than the teacher explain when someone does not understand.

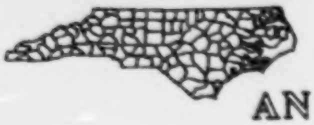
* Encourage students to "think aloud."

MATHEMATICS AND SOCIAL STUDIES: AN INTEGRATED APPROACH



We had hoped to be able to include all of the maps needed to complete the activities in this section; however, due to copyright laws, this is not possible.

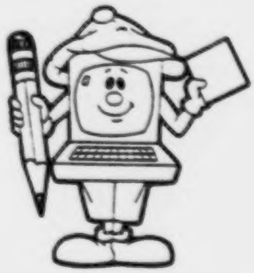
We have included a few basic maps. You will want to locate world, United States, and possibly additional North Carolina maps. Telephone books have maps with time zones and atlases will have the continents.

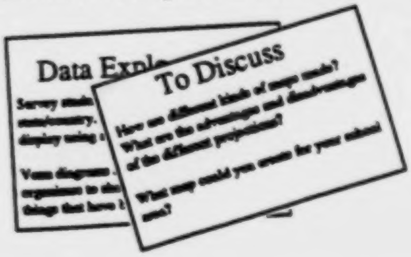


INTRODUCTION: AN INTEGRATED APPROACH

The purpose of this section is to launch the school year with an integrated approach in social studies and mathematics. The lessons address the following overall goals:

- Assess students' facility with computation (addition and subtraction), telling time, and place value; writing story problems.
- Name and use ordered pairs in a variety of settings; relate coordinates to longitude and latitude. Explore parallel and non-parallel lines.
- Review spelling of number words; use estimation and rounding within a context.
- Apply classification skills in social studies and language arts activities.
- Use logical reasoning in mathematical games as well as data activities.
- Collect, organize and display data. Interpret results. Read, interpret, and develop charts and graphs.
- Acquire information from a variety of sources.
- Use information for problem solving and decision making.
- Analyze data and make predictions.
- Know and apply map and globe skills.
- Develop a sense of time and chronology.
- Classify, interpret and evaluate information.
- Develop skills of self-management and social participation.
- Assess students' ability to use alphabetical order.
- Provide opportunities for various writing activities.
- Develop study techniques for content areas.
- Introduce parts of a book: Index, Glossary, Gazateer, Table of Contents and develop research skills.
- Develop interviewing and oral discussion skills.
- Work with a partner or in a small group to accomplish established goals.
- Take responsibility for having materials ready and assignment completed on time.
- Set personal goals for a task. Assess personal performance on assigned tasks.
- Relate prior knowledge and personal experiences to topics.
- Formulate questions to be answered. Predict outcomes.
- Discuss, outline, or summarize new facts, information, or ideas.
- Note agreement or disagreement with ideas presented in a selection or activity.
- Identify key words and discover their meanings and relationships through a variety of strategies.
- Condense, combine, and order information.
- Compare information and ideas. Form generalizations based on new information.
- Solve problems, make decisions and inferences, or draw conclusions based on interpretation of information.
- Follow or produce directions to create a product or develop ideas based on interpretation of information.





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NOTES FOR THE TEACHER

Each segment will refer you to activities described in other sections of this guide such as the *WEEK-BY-WEEK ESSENTIALS* and *180 ESTIMATION ACTIVITIES*. By inserting your own favorite opening of school activities, you will have a complete plan for social studies and mathematics. You will need to plan time for "housekeeping", those bookkeeping chores and establishing routines and rules that are a part of the first few days of school.

Because each segment's plans begin on a new page, you can insert your notes immediately following these plans to make next year even easier. You may want to note textbook and other resources which fit with your plans.

In each segment there are activities which offer opportunity for informal assessment. Whenever possible, observe students working in pairs or small groups to gather information about their abilities to work with others and their skills related to specific objectives. You can learn a great deal about a student through observation. The time you save by not choosing to use more formal paper and pencil tests that need correcting can be invested in valuable planning time and in beginning a folder (portfolio) for each child.

Most of the activities involve cooperative group strategies. You may decide to have students work in pairs rather than larger groups for many of the activities and then combine pairs for larger groups. In order to have opportunities to observe interaction skills and to provide opportunities for students to get acquainted, it is important to build in time for student interaction. Research supports the fact that students learn more, faster, and with better retention when allowed to work together to construct their own understandings.

These plans also include suggestions for homework assignments. According to self-reporting by teachers in North Carolina on the NAEP profiles (National Assessment of Educational Programs), they assign less homework than teachers in other states. Student self-reporting also verifies that NC students spend less time doing homework in our state. No doubt that time spent on homework correlates with school progress and success. For this reason you will find homework assignments included in these materials. You will need to adjust the timing of the homework assignments in order to assign homework Monday through Thursday.

Begin planning early for subsequent weeks and for long-term projects. You may wish to start the "Partner Class" project early in the year (see the section titled *We Like Calling North Carolina Home*) or concentrate on getting other North Carolina displays and bulletin board components in place.

You can order North Carolina road maps from
North Carolina Department of Transportation
Mapping Section
919-733-7600
You will use these during this unit as well as throughout the year.

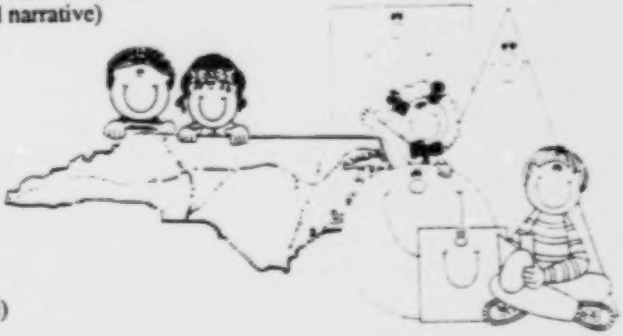
AGENDAS

Segment One

Groups of Four (establishing groups)
Wipe Out (game of the week, basic facts and probability)
Brainstorm Seven Lists of Seven (alphabetical order, writing, problem solving)
Groups of Seven (same as above plus leading to continents)
Continents Murals (map skills)
Seven 7-Word Sentences (writing, common & proper nouns)
Headline Stories (basic facts, writing, homework)
Estimation (lead-in for data activity); Wrap-Up Discussion
Keeping a Learning Log (writing a personal narrative)

Segment Two

Homework Sharing
Our First Names (data gathering)
Estimation (lead-in for data activity)
A Round Earth on a Flat Map (map skills)
Grid locations (geometry - coordinates)
Paper Plate Hemispheres (map skills)
Latitude and Longitude
Target Number (basic facts and place value)
Revisit Wipe Out
Mental Math (see WEEK-BY-WEEK ESSENTIALS, Week 1)



Segment Three

Homework Sharing
Our Last Names (data gathering)
Estimation (lead-in for data activity)
Estimating Paces (lead-in for direction writing)
Finding Facts and Putting Them Into a Story
Find the Ferret (coordinates, and compass rose)
Room Orientation (map skills)
Problem for the Week (see WEEK-BY-WEEK ESSENTIALS, Week 1)
Mystery Places (latitude and longitude, homework); Enjoying other mysteries
Guess My Number (homework)

Segment Four

Homework Sharing
Where Were We Born? (data sort)
World Travelers (map skills, place value, computation, homework, extension)
Personal Post Cards (goal setting, writing address)
Calculator Activity (see WEEK-BY-WEEK ESSENTIALS, Week 1)
School Directions (writing directions)
Estimation

Segment Five

Homework Sharing
Discussion Question (see WEEK-BY-WEEK ESSENTIALS, Week 1)
Revisiting Our Names (graphing)
Time Zones (map skills, telling time)
Philately (problem solving with stamps)
Daily Estimation*

*See *180 Estimation Activities* for suggestions or design your own estimation activity for the day.

AGENDAS

Segment Six

Game of the Week (see WEEK-BY-WEEK ESSENTIALS, Week 2, practice with coordinates)
Pie Borders (problem solving)
North Carolina Road Map (map skills)
Transportation (data representation, homework)
Math is Important Because (writing)
Daily Estimation*

Segment Seven

Homework Sharing (data interpretation)
Mental Math (WEEK-BY-WEEK ESSENTIALS, Week 2)
Circle Puzzles (spatial visualization and problem solving, homework)
Population War (rounding, data gathering)
What is a City (writing)
Daily Estimation*

Segment Eight

Homework Sharing
Problem of the Week (WEEK-BY-WEEK ESSENTIALS, Week 2, homework)
Crossing the State (Map skills, estimating mileage, writing)
Revisit Target Number (place value and operations)
Discussion Question (WEEK-BY-WEEK ESSENTIALS)
Daily Estimation*

Segment Nine

Homework Sharing
Vacation Land (map skills, writing)
Writing Fictional Accounts
The Value of Maps (writing)
Calculator Problem (WEEK-BY-WEEK ESSENTIALS, Week 2)
Circle Pattern Search (problem solving)
Daily Estimation*

Segment Ten

Homework Sharing
County Classification (map skills, data analysis, large number reading)
County Concentration (county seats)
Home Sweet Home (writing, gathering information)
Classic Map Problem (problem solving)
What Am I? (vocabulary review)
Daily Estimation*

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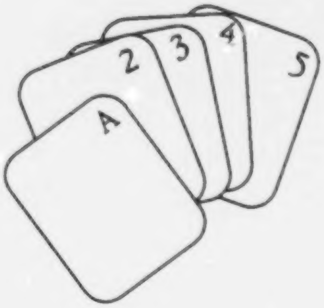
*See *180 Estimation Activities* for suggestions or design your own estimation activity for the day.

LESSON PLANS
Segment One



Groups Of Four

Materials:

- deck of cards (ace through 7, discard 8, 9, 10, Jack, Queen, and King) placed in bag or box

How:

Students draw cards randomly. All aces form a group, all the twos form group, etc.

Wipe Out

Materials:

- gameboards (1 per student, see WEEK-BY-WEEK ESSENTIALS)
- gameboard markers (plastic chips, 15 per student)
- regular dice (2 per group)

How:

To introduce this game to your class, play it as a total group:

- Each student has a Wipe Out gameboard and 15 markers. (Gameboards are printed 2 per page to save paper. (Since you may wish to have students play a variation of this game later in the year, you could run them off on heavier paper and laminate them.)
- Students place all 15 markers on the gameboard according to their individual plans (all markers must be placed but not all numbers have to be covered)
- The object of this game is to "wipe out" the collection of markers and clear the board
- Roll two dice and announce the two numbers and their sum
- Individual students then remove one marker from the sum on their board, if possible.
- After about seven rolls, take an informal survey to see how many and which numbers are still covered. Have students take turns rolling for the class.
- Continue playing until someone has cleared his or her board.

Now students are ready to play this game in pairs or small groups. After students place their markers, someone rolls the dice and announces the sum. Everyone in the group removes a marker from that sum. The dice are passed to another player and play continues. When one person "wipes out", that round of the game ends. Players figure their scores for that round by adding the numbers still covered. If there are two markers on the 6, that counts as 12, etc. The person who "wiped out" has a score of 0 for that round. Play more than one round and determine each person's final score by totaling the points from each round.

Hopefully, some issues will surface for total class discussion. What happens if several members of the group have the same numbers covered with the same number of markers? Do you call it a draw and start over? Do you continue play? Who is the winner in this game ... the person with the highest or lowest score? Are students changing their minds about where to place markers? Why?

NOTE: This activity provides an opportunity for informal assessment of addition facts to twelve. While play is in progress, you can move about the class, observing or quizzing students on these easier facts. You may wish to introduce (or reinforce) the "Think-Pair-Share" techniques as a way to approach problem solving.

7 7 7
7 7
7

Brainstorm Seven Lists of Seven

Materials:

- large sheets of paper for listing (7 per group)

How:

Each group needs to decide how to handle the recording of ideas (one recorder, or a different recorder for each list, or ...). Students proceed to brainstorm and record the following seven lists:

* seven things they like to do.
* seven favorite foods.
* seven words related to school.
* seven famous people.
* seven states' names.
* seven things that can be found in the kitchen.
* seven book titles.

They will brainstorm more than seven items for each group, but then they must decide which seven words to include in each list. Next, they alphabetize each list. An added challenge might be to make as many things as possible on each list also be seven-letter words. You might consider giving a "Lucky Seven Award" to the group with the most seven-letter words.

Have students post their lists and discuss results. How many lists overlapped? Did any patterns emerge? Can any conclusions be drawn? Of what value is brainstorming? How many total items are on each groups' final lists (7 x 7)?

NOTE: Here's another informal assessment opportunity. Look for alphabetizing skills, students who can easily generate ideas, and students who are supportive of contributions from others.

Groups of Seven

Materials:

- large sheets of paper for listing

How:

Many things in our world come in defined and accepted numbers; such as one dozen eggs, 26 letters of the alphabet, etc. As a total class, brainstorm a list of things that come in pairs or twos; such as, eyes, twins, wheels on a bicycle. (Some things that we used to accept as pairs, like earrings, might cause discussion regarding their inclusion on the list since some folks wear one earring) You might also want to brainstorm a list of things that come in fives if your class needs a little more practice before going on.

Have students work in groups to brainstorm things that come in sevens; the seven dwarfs, seven wonders of the ancient world, etc. After a reasonable time, have groups share their lists. You might want to compile a master list by posting one group's and adding to it from others' lists. Hopefully, some groups will list the seven continents. If no group comes up with this, add it as coming from your list. Lucky Seven Day is designed to help students remember there are seven continents.

Continents Murals

Materials:

- globes, social studies books, or world atlases
- blackline masters of the seven continents (one set per group, see blackline masters section)
- 18" by 24" paper (1 per group)
- scissors, crayons, and paste

How:

Introduce the seven continents and their location in your usual style. Explain that each group will be making a "mural" of the continents by coloring, cutting and pasting the continents in their relative positions on the large piece of paper. You might want to take this opportunity to search through the social studies books to familiarize students with the important sections; i.e., Table of Contents, Index, Glossary, Gazateer (This might be reinforced later through some kind of scavenger hunt). Encourage students to make good use of the resources provided; ie., globes, maps, and books. Distribute materials and allow groups to work on the project, negotiate jobs, and make decisions about placement of continents on their murals. You may want to emphasize that you expect to see everyone contributing to completing the task. You might point out the Equator as a half-way mark on their murals and that the prime meridian and International Date Line separate the hemispheres. Students may also want to locate and label the 4 oceans and some of the seas. Have students approximate the location of North Carolina on their murals and mark an "X" on that spot, also noting the continent.

Post the murals. To help students focus on cooperative activities, you may want each group to report how they went about organizing themselves in order to accomplish the task. Have students write, as a group, an account of what they did and then compare accounts.

Seven Seven-Word Sentences

SEVENSEVENSEVENSEV
ENSEVENSEVENSEVENSEVEN
SEVENSEVENSEVENSEVEN

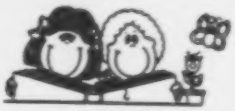
Materials:

- paper and pencils

How:

As a class, spend a few minutes writing some seven-word sentences about the murals just created. For example: **Europe is a continent west of Asia.**

Students work in groups to write seven sentences each with seven words about their murals or other activities for the day. Have groups share their favorite sentence with the entire class by writing it ahead of sharing time on an overhead transparency or large sheet of paper. How many words did each group write? (seven sentences x 7 words = 49 words)



ASSIGNMENTS

Headline Stories

Materials:

- paper and pencils

How:

Conduct a class brainstorm session with a list of number facts which use 7. For example; 7 x 7 = 49, 4 + 3 = 7, etc. Introduce "Facts of The Week" from the "WEEK-BY-WEEK ESSENTIALS" and explain how each week will focus on special number facts.

Model choosing one of these facts as a "headline" and then write the story that goes with it.

7 x 7 = 49

"Mrs. Smith's students wrote seven sentences, each having seven words. How many words did each group write?"

Homework: Pick seven headlines and write the stories to go with them.

Estimation

See *180 Estimation Activities* for a suggestion.

Wrap Up Discussion

Lead a discussion of these questions: Is there such a thing as a lucky number: What evidence do you have for saying yes or no? Why has this been "Lucky Seven Day?" What is lucky about the number 7? You may want to return to this last question several times after revisiting the game of "Wipe Out." Extension: For students ready for research, you may wish to have students survey people about what they consider to be "lucky" and "unlucky" things.

Keeping a Learning Log (Journal)

Materials:

- notebook used for journal entries throughout the weeks

How:

Have students write a story or an account of when they had a lucky or an unlucky day. Use this writing assignment as an initial assessment of your students' abilities to write a personal narrative.

Subsequent entries, during the next weeks in the learning logs, could include additional narratives, discussions about what they have learned, things they are puzzled about, or ideas they wish to investigate. Journal writing may be a combination of specific assignments and open-ended writing. Students might write new endings to stories or summarize what they are learning about North Carolina. They might explain what a fraction is or tell how they classified objects. A suggestion from a communication skills consultant: consider a two-column journal. The first column can be used to record notes and observations and the second to reflect on the notes and observations or to reach conclusions.

LESSON PLANS:
Segment Two

Homework Sharing

Materials:

- students' homework products

How:

Have students read their headline stories to each other in small groups. As each story is read, students decide whether or not the stories match their headlines. Then the group picks one headline and story to share with the rest of the class, telling why they chose that particular example. Collect individual papers. Since research supports having students write story problems as one strategy for improving students' abilities to solve problems, you will want to give similar assignments throughout the year. You might use the problems of the week and plan for students to write four stories using those facts as their headlines. Be sure to plan time for discussion and modeling of the stories students write. Many times students will use the assigned numbers, but their stories will not match the given operation.

Our First Names

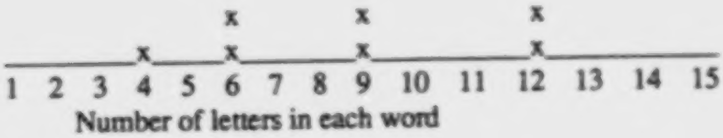
Materials:

- A large piece of chart paper
- wide tip markers

How:

Review the names of the seven continents and determine the number of letters in each name. Model making a line plot using this data.

Names of Continents



North America (12)
South America (12)
Europe (6)
Asia (4)
Africa (6)
Australia (9)
Antarctica (9)

Discuss this form for displaying data. Point out the importance of a title and a label for the numbers. What are the advantages of the display? What can you tell about the data?

Tell the class that you want to make a line plot showing the lengths of everyone's first name. What kinds of numbers would be appropriate for the line? Where should we begin and end the numbers? Set up the number line allowing space to extend at each end if necessary. Label the graph. Have each students figure the number of letters in their first names and add this data to the line plot.

Have groups of students write at least four statements about this graph. If other classes in this school made a similar graph, what would you expect these graphs to look like?

How many letters do we have altogether in our first names? How does this compare to our estimate from yesterday?

Save this line plot for an activity in Segment Three.

Estimation

See *180 Estimation Activities* for an idea.

A Round Earth on a Flat Map

Materials:
- globes, books, atlases, social studies books
- map of the world (1 per student, see blackline masters)
- newspapers for stuffing small globes
- scissors, crayons, tape

How:

Have students compare how the continents look on the globe compared to a map. Have students report their observations, explaining similarities and differences. Distribute the map of the world and let students talk about why the maps are drawn this way. Compare this projection with a rectangular map that has longitude lines drawn parallel rather than coming together at the North and South Poles. You may want to have students color the continents and oceans. Have students cut out their maps and tape the bottom into a sphere shape. Then students stuff their globes with wadded newspapers before taping the top. Working with a partner will help. (This is a difficult task and will not result in perfect spheres; it is valuable, however, in helping children visualize the problems of showing the world on a flat map.) Now compare the newly constructed globes with commercial globes in the classroom. Have students talk about what they observe.

Grid Locations

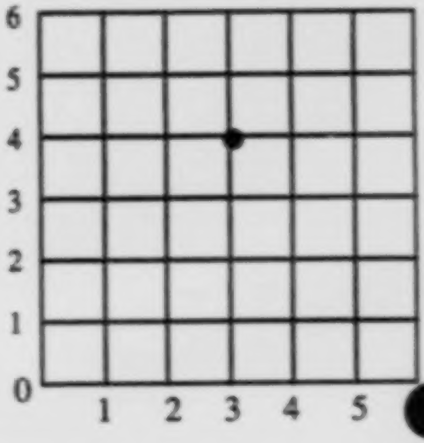
Materials:
- 1" graph paper (1 piece per partnership, see blackline masters)
- marking pens
- transparent plastic markers or something similar in size in 2 different colors

How:

Give each pair of students a piece of graph paper and ask them to make a coordinate grid by numbering the vertical and horizontal grids from 0 to the highest number possible. Students take turns placing plastic markers on coordinate points and announcing the location name as an ordered pair Remind students to read the horizontal axis first, then the vertical (right, then up). On the example, a marker is shown as 3, 4.

Then have students play "four in a row" by taking turns placing markers of their own color and announcing the location each time. The objective is to be the first to get four of one's own markers in any row (horizontal, vertical, or diagonal). If a player "miscalls" the coordinates upon placing a marker, then the opponent gets two turns in a row.

Variation: roll two regular dice, one white and one a color. The white die gives the first number and the colored die gives the second number of the pair. If you use dice, play "three in a row."



Paper Plate Hemispheres

Materials:

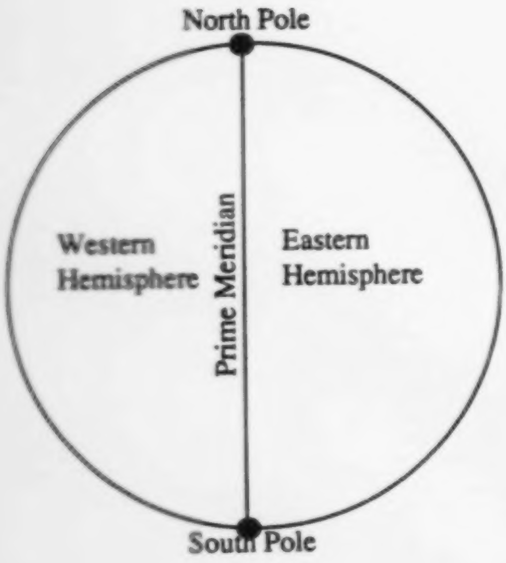
- paper plates (2 per student)
- globe
- masking tape
- marking pens

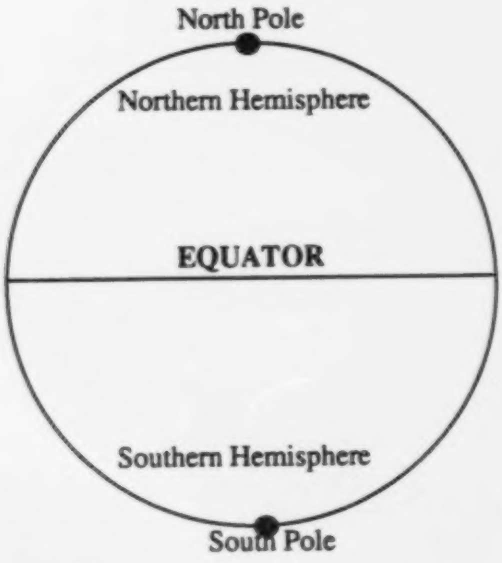
How:

Using the globe and a thin strip of masking tape, demonstrate how the earth is divided into two hemispheres by an imaginary belt called the equator. Have students draw a line representing the equator on one of the paper plates. You might want to discuss how students will decide where the middle of the plate is in order to represent the equator. Students should label and color the Northern Hemisphere red and the Southern Hemisphere blue. Discuss the fractional parts that the equator creates and the meaning of the word "hemisphere."

Now demonstrate in a similar fashion how the Prime Meridian and the International Dateline divide the globe into Eastern and Western Hemispheres. Have students draw the Prime Meridian on their second paper plate. Label and color the Eastern Hemisphere yellow, and the Western Hemisphere green. Again discuss the connection to fractions. On both paper plates, label the North and South Poles.

Have students work in groups to identify which continents are located in which hemispheres. Have students add the Prime Meridian and Equator (if they have not already drawn it) to their previously created paper globes and the continents murals from yesterday. This activity might provide some interesting problem solving opportunities and discussions. Discuss whether or not continents can be identified as being in the Northern or Southern Hemispheres and Eastern and Western Hemispheres.





Latitude and Longitude

Materials:

- balloon, orange, or styrofoam ball (1 per pair of students)
- marking pens
- globes

How:

Remind students about the coordinate system created earlier in the day. Explain that the globe is divided into imaginary sections in a similar manner in order to make locating places easier (*you may wish to tell students that you'll be tracking hurricanes this fall by using these lines*). Pass out materials and have students work with you as you model. First mark the North and South Poles and the Equator. Show students that the Northern and Southern Hemispheres are divided further by lines which parallel (lines which always stay the same distance apart) the Equator. You draw northern latitudes of 10° through 80° and the same southern latitudes, explaining that the Equator is 0°. Have students draw two to four latitudes on their own models in each hemisphere, being careful to keep the lines parallel to the Equator. Have students locate the latitudes that approximate the United States and more specifically, North Carolina. You may wish to draw a globe on the board and draw parallels on it as well as your sphere.

Next, draw the Prime Meridian and International Dateline and some lines of longitude. Ask students to explain how these lines differ from latitude lines. Talk about parallel and non-parallel lines, relating your discussion to your drawings of meridians of longitude and parallels of latitude as well as other models (railroad tracks, lines on notebook paper, and rays from the sun). Have students add these to their models in a similar fashion. Locate the North Carolina longitude. Then, locate North Carolina by putting latitude and longitude together as a reference point on the globe, much like the ordered pairs on a coordinate system. Talk about how the lines of longitude relate to the time zones and the significance of the International Dateline. (In Segment Five you will go into greater depth with the time zones.)

Target Number

Materials:

- set of 0 - 9 digit cards (1 set per pair of students) or number tiles.
- paper and pencil

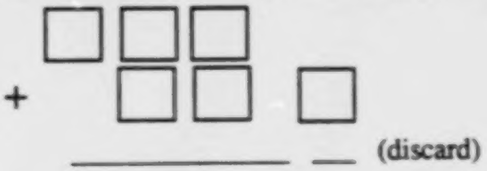
How:

Distribute materials. Have each pair of students draw four cards randomly from their set. Then they arrange these same four cards in different ways. Encourage them to talk with each other about the possibilities.

- create the largest possible number
- smallest possible number
- a number as close to 3500 as possible

Have some pairs report their largest number as you record on the chalkboard. Then pairs (or individuals if you want to use this as an assessment activity) order the list of numbers from smallest to largest. Do the same thing with the smallest possible numbers and those closest to 3500. Have students determine how far each number in the last list is from 3500. *(Watch to see which students easily set up the subtraction problems and those who need help. Note accurate subtraction. Also note any students who do the task mentally or who use different strategies.)* How is this related to sequencing the original list of numbers closest to 3500?

Next have students draw these boxes on their papers:



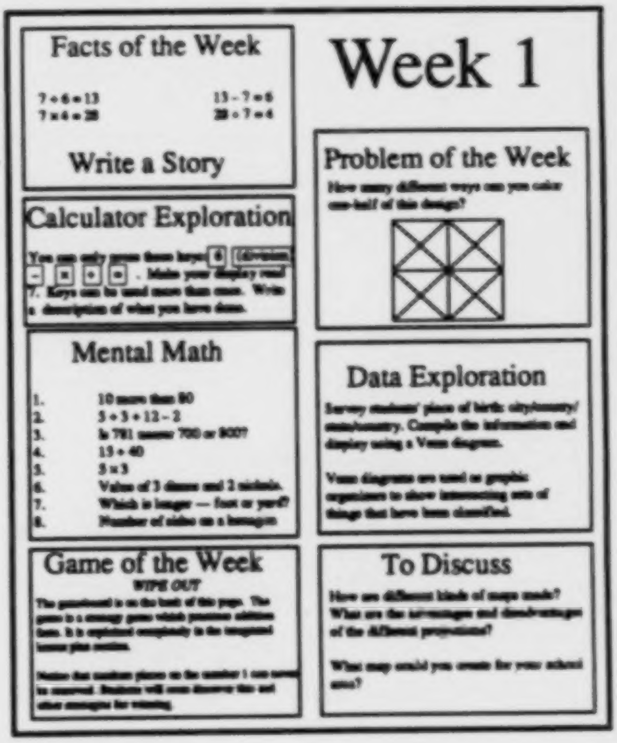
Students draw 6 cards each this time and place these numbers in the boxes in order to create a sum closest to the target number that you have chosen (say 325). Notice that one of the numbers gets discarded. Let students take turns picking the target numbers. Repeat this activity several times and allow students to present their work on the board to the class. During the first month of school repeat the activity again with subtraction instead of addition.

Revisit Wipe Out

Allow groups of students to play while you work with other groups.

Mental Math

See WEEK-BY-WEEK ESSENTIALS, week 1. Introduce the weekly mental math activity. Talk about the goal of mental computation and the review of general knowledge. In the beginning, you may wish to write your list on the overhead, repeating each question once and then moving on. Students do all computations mentally and write only the answers. Take time to go back after you have called out all eight questions and have students tell how they thought about the individual items. Some will suggest strategies that their classmates will begin to use. (By the second month of school, you should not be writing the list, but calling it out to the class.)



Week 1

Facts of the Week

7 + 6 = 13
13 − 7 = 6
7 × 4 = 28
28 ÷ 7 = 4

Write a Story

Calculator Exploration

Problem of the Week

How many different ways can you color one-half of this design?

Mental Math

1. 10 more than 80
2. 5 + 3 + 12 − 2
3. Is 781 nearer 700 or 800?
4. 13 + 40
5. 5 × 3
6. Value of 3 dimes and 2 nickels.
7. Which is longer — foot or yard?
8. Number of sides on a hexagon

Data Exploration

Survey students' place of birth: city/county/state/country. Compile the information and display using a Venn diagram.

Venn diagrams are used as graphic organizers to show intersecting sets of things that have been classified.

Game of the Week

WIPE OUT

To Discuss

How are different kinds of maps made? What are the advantages and disadvantages of the different projections?

What map could you create for your school area?

Homework

a. Have students write their own list of mental math questions for home work. Encourage them to include something about their map studies in items 7 and 8 of their lists.

b. Have students think about the activities from today. Ask them to write about their favorite activity and why they liked it best.

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Lesson Plan:
Segment Three

Homework Sharing

Materials:

- Student homework products

How:

Have students work in groups of four. Students read their sets of questions to the others as they write answers (like you did the previous day). Collect the papers to examine individuals' work and to make additional mental math lists for use with the class.

Ask for volunteers to read their papers about their favorite activities. Collect these papers as an initial sample for each student.

Our Last Names

Materials:

- line plot of first names
- large paper
- marking pens

How:

Review what was done previously with plotting data from first names. Proceed in a similar manner using last names, having students tell you the steps. When the graph is complete, compare the two line plots and ask students to explain similarities and differences. Have groups write statements comparing the two sets of data. Take this opportunity to brainstorm other kinds of data that the class would like to gather about themselves. Based on this list, you may want to add some questions to the Student Census sheet which is used in Segment Four. (Throughout the fall, groups of students can choose a topic and be responsible for gathering the data from the student census and making a graphic representation.) With the class you will want to look at other kinds of graphs in papers and magazines and the math book. Let students decide what kind of graphs to make for their data. Have students write a newspaper article discussing the data activity. Talk about the 5 Ws and one H *(who, what, when, why, where, and how).*

Estimation

This would be a good time to predict how many students were born in your county for tomorrow's data gathering. You might use sticky notes to record predictions or simply have students graph a response to this question: *"Were more students in our class born in this county or were more born in other places?"*

Estimating Paces

Materials:

- regular sized piece of paper (1 per pair of students)

How:

Explain that you want the class to write directions for getting around the school. In order to accomplish this, one thing we want to find out is the distance of an "average" pace. You want the students to watch as you walk back and forth and get an idea of about how far apart your paces fall. Then, place a piece of paper on the floor a distance away from you and ask the students to estimate the number of paces it will take for you to reach the paper. Repeat this several times until most students can predict fairly closely the number of paces needed.

Next, you will ask the students to direct you to a certain place in the room; for example, the pencil sharpener. They will need to do this by directing you around obstacles in the room; having you turn right and left and taking paces. All turns should be 90 turns in order to simplify directions. You might relate turns to the idea of going from facing the front wall of the classroom to facing the adjacent wall to the right; this might be defined as "turn right". This is much like making right and left turns at street intersections.

Students should now get with a partner and take turns practicing the same skills. First estimating paces and then directing each other to various places in the room. Have each pair of students choose one set of directions to write out. They'll need to be sure to include a starting place and direction being faced. Pairs of students could then trade directions with other pairs for "field testing" of directions.

Tell students that the class will return to this activity in order to write directions for moving about the school later.

Finding Facts and Putting Them Into a Story

Materials:

- Library books and encyclopedias on ferrets and on map making
- Chart paper or sentence strips
- Marking pens

How:

Work with the media coordinator to gather resource books which have information about ferrets and others with information about map making. Divide the class into two groups. Each group is to gather interesting bits of information about their topic (ferrets or map making) and write the information on large chart papers on in sentence strips. (Make strips by cutting 19" x 24" newsprint into six 3" x 24" pieces.) These notes do not need to be complete sentences.

When the class comes back together, display the information from each group and have students choose one topic about which to write. Students should use the information gathered by their classmates to write a story. Have students write their stories in their learning logs. Alternative writing directions: Answer one of these questions: What have you learned about ferrets? or What have you learned about making maps?

Find the Ferret

Materials:

- Find the Ferret gameboard (1 or more per person, you may want to laminate these for reuse, see blackline masters)
- pencils or vis-a-vis markers

How:

This game combines practice in using the compass directions and coordinate locations with logical thinking. Review the use of the compass rose and determining directions. (A blackline master with compass roses is included so that you can give each student one for map work.)

Model playing the game with the entire class. Give each student a copy of the gameboard and a marker to help them see moves from one location to another. You hide an imaginary ferret on the gameboard on the overhead at one of the coordinate locations. Students guess a coordinate location. You record the guess and give a clue by telling the students which direction on the compass rose to move in order to find the ferret. The object of this game is to find the ferret with as few clues as possible.

Students then play this game with a partner. Have the students put a file folder or some other divider between them. Talk about strategies for guessing locations. Are some guesses better than others in terms of giving more information? You may want to have students brainstorm ways to vary this game in order to create a new one.

This is a good time to discuss the difference between locating a position on a coordinate grid and locating a place on a map using latitude and longitude. When using coordinates, we move left and right and then up or down. That is, we name the number on the x-axis first and the y-axis second. When locating a place on a map, however, we report latitude (direction north or south of the Equator) first and then longitude (direction east or west of the Prime Meridian). Whenever using the compass rose, we name north and south before east and west. For example; we might tell someone to go northeast to find the ferret, not eastnorth.

Room Orientation

Materials:

- paper and marking pens for labeling walls
- compasses

How:

Tell students that you want to label the walls in the classroom according to their compass locations; ie., which wall is on the north side of the room, etc. Have students brainstorm ideas for locating this information (observe the sun in the morning, use a compass, etc.). If students do not know, you may want to explain to the class that if they go outside at noon and stand facing their shadows, then they are facing north.

Have pairs of students to decide and to follow through with a strategy for gathering this information. When everyone has completed the search, come to class consensus about how to label each wall in the classroom. Decide where North is located when you stand in the center of your classroom. Discuss the orientation of the school building also. Does one side of the school face North?

Problem for the Week

Materials:

- problem design (one or more pages per person, see blackline masters)
- crayons

How:

Remind students about dividing the earth into halves by using the Equator and then the Prime Meridian and International Dateline. Introduce the problem of the week as further opportunity to investigate dividing something into halves. Give each student a copy of the blackline master which matches the problem of the week design.

Have students work in groups and share solutions as they proceed. How will they know when they have found all the possibilities? How did having the square divided into triangles help with this task?

Mystery Places

Materials:

- Atlases, social studies books

How:

Explain that you are going to give the class some clues to help them find some mystery places. Their job will be to use the clues and maps to locate and name each mystery place. You might want to write all the clues on an overhead transparency or large piece of chart paper. Have students work in pairs to locate these mystery places:

Can you find this mystery city?

- north of the Equator
- west of the Prime Meridian
- south of 40^0 North
- east of 80^0 West
- it is a capital
- it is at 36^0 N/ 79^0 W

Can you find this mystery state?

- south of the North Pole
- north of the Equator
- borders the largest body of water
- east of 125^0 W
- west of 115^0 N
- north of 40^0N
- most of the state is south of 45^0 N

You could introduce minutes during this lesson. For example, locate 36^0 30' N latitude.

You may want to reveal one clue at a time, each time asking if students need more information to locate the mystery place.

Now have students work in pairs to write clues for specific places such as London, the Hawaiian Islands, North Carolina, etc.. Have groups share clues with each other to field test their feasibility.

With your partner, pick two mystery places and write clues for finding them. Be sure to check your clues to make sure they do indeed locate the mystery place. Put these on index cards to share with others.

Enjoying Other Mysteries

With the media coordinator's assistance, arrange a display of books that are mysteries or detective stories. You might wish to read an Encyclopedia Brown adventure and discuss the variety of books that are in the group. What is a mystery? Do all mystery stories have clues? Your display may lead you into North Carolina ghost stories.

Guess My Number

Materials:
- pencil and paper

How:

Discuss the use of clues to help solve the puzzles and ask students to figure out what numbers you are thinking of when you give them these clues:

1. It is less than 700 but greater that 600.
2. All digits in this number are even.
3. There is no 4 in my number.
4. The sum of the digits is 14.
5. It is a multiple of 10.

Review the puzzle to see what information each step gives you. As a class, write clues to describe the number 35. Review vocabulary (multiples, sum, odd numbers, etc.) and brainstorm as many clues as you can. Then choose 5 clues to make a puzzle for 35. As a class, also write the clues to describe 252.

Homework:

a. Choose two numbers less than 1,000. Write a number puzzle with at least 5 clues for each of these.
b. Check with your parents to be sure you know where you were born.

Fourth grade students will continue to find Hundred Board activities fun and challenging.

Lesson Plans
Segment Four

Homework Sharing

Materials:

- students' homework products

How:

Proceed in a similar manner with other homework sharing activities in small groups. Have students take turns reading their clues while others in the group try to figure out the mystery number. Discuss what strategies students used for sequencing clues (general to more specific, etc.). Homework papers could be modified (if necessary) and made into a number puzzle book.

Where Were We Born?

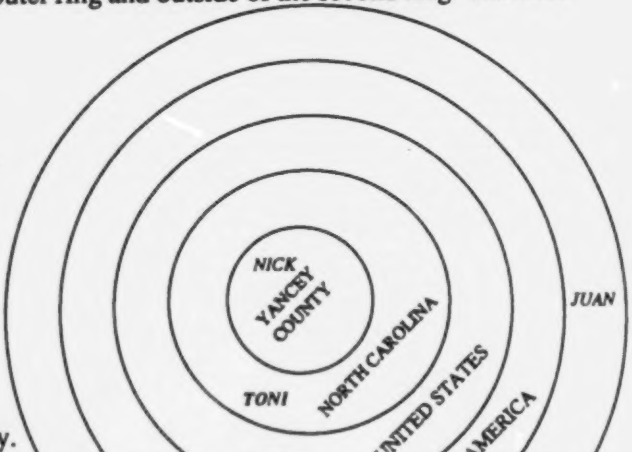
Materials:

- a large circle or oval drawn on the bulletin board or large piece of chart paper
- post-it notes or cards and pins
- marking pens
- personal census sheets (1 per student, see blackline masters)

How:

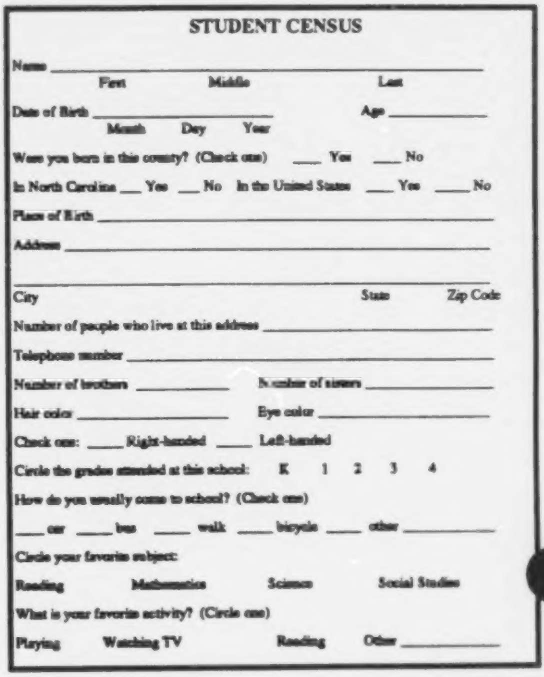
Place the following list on the board or overhead: continent, country, county, community, state, world. Question students to determine relationship among items. Ask each student to make a list placing these in order from the smallest to the largest. Then, in small groups, students discuss their arrangement and create a graphic organizer or other visual representation to show the relationship. On a bulletin board, draw a large circle or oval and label it "World." Discuss the fact that all of the class could place their names inside this ring when indicating place of birth (you might want to have everyone write his or her name on a post-it and place it inside this first ring). Ask students if they were all born on the continent of North America. Draw a second circle inside the first, place names of those born outside North America within the outer ring and outside of the second ring. All other names would be inside the second ring.

Continue in this manner with finer and finer classifications and moving names into appropriate places. Give students opportunities to explain what the placement of names within each circle means. In this example, Toni was born in North Carolina but not in Yancey County. Tonya was born in some state other than North Carolina. Nu was not born on the North American continent. Compare the data with yesterday's estimation about the number of students born in this county. Have students write at least three questions that could be answered by looking at this data representation. Have students ask their questions and let others answer. You may want to have students write answers and use this as another informal kind of assessment.



Have students discuss how this kind of data representation compares with line plots. What advantages might this kind of representation have over line plots, or in what situations would you choose to use either of these types of graphs?

Have each student complete the Student Census Sheet and put them into a notebook for future use. You may want to add ideas from the list of things students brainstormed in Segment Three regarding other data to gather about the class. This notebook will provide a data base for the class to use at various times when working on data analysis.



STUDENT CENSUS

Name ____________________
First Middle Last

Date of Birth ____________ Age ________
Month Day Year

Were you born in this county? (Check one) ___ Yes ___ No

In North Carolina ___ Yes ___ No In the United States ___ Yes ___ No

Place of Birth ____________________

Address ____________________

____
City State Zip Code

Number of people who live at this address ____________

Telephone number ____________

Number of brothers ________ Number of sisters ________

Hair color ________ Eye color ________

Check one: ____ Right-handed ____ Left-handed

Circle the grades attended at this school: K 1 2 3 4

How do you usually come to school? (Check one)

___ car ____ bus ____ walk ____ bicycle ____ other ________

Circle your favorite subject:

Reading Mathematics Science Social Studies

What is your favorite activity? (Circle one)

Playing Watching TV Reading Other ________

This would be an opportune time to use the computer as a tool. Using the database software available, have students enter all of their personal data. Use this database to retrieve information as needed for later data representations.

World Travelers

Materials:

* cities and distances from Raleigh by air:

London	3880
Moscow	5103
Paris	4043
Cairo	6023
Ottawa	672
Rio de Janeiro	4662
Tokyo	6903
Los Angeles	2235
Melbourne	9931
New Delhi	7728

* atlases, globes, social studies books
* string

How:

Tell students that they need to locate these cities on the world maps they made and find the country and continent in which they are located. (You may want students to also write latitudes and longitudes.) Ask students how they might use the mileage information provided to help them locate these cities. Might a piece of string be helpful? Why or why not?

Using the information gathered and the mileage information, students work together to find answers to the following questions:

* Terry's father flew from Raleigh to New York, then to Los Angeles and back to Raleigh. How many miles was his trip?
* John wants to take a short trip to another country. From the list provided, which city should he visit?
* The Smith family wants to visit either London or Paris. Which is closer to Raleigh? How much closer?
* Which city is about 7,000 miles from Raleigh?
* If Sally takes a roundtrip flight to Cairo, how many miles will she travel?
* Which city should involve the longest flight time?
* Arrange all the cities in order from farthest away to closest, using Raleigh as the reference point.

Homework:

Write at least 5 more questions about this information. Try to include what we've learned about continents, latitude and longitude. Answer each of your questions.

Extension

Students could assemble travel brochures from places they have been or would like to go. Have a student(s) find (in the library) the location of books about other countries and report to the class.

Personal Post Card

Materials:

- 5" x 6" index cards (1 per student)
- list of objectives from mathematics or social studies on an overhead transparency

How:

Share the objectives from the curriculum area you have chosen. Discuss the importance of setting personal goals in relationship to making progress. Give some examples of goals that might be set in relationship to some of the objectives from the course of study. For example; by the end of this grading period, I'd like to be able to read and understand different kinds of graphs (line, bar, stem and leaf, and circle). By a date determined by teacher and students, I'd like to be able to read a road map, find my location, and determine its relationship to other cities, counties, states, and countries.

Help students brainstorm some possible goals. Be sure to focus on setting realistic goals which include deadlines. Distribute index cards and have students write a note to themselves about the goals they want to have accomplished by a designated date. On the reverse side of the card, each student addresses this "post card" to himself or herself. Work with students on how to correctly address their post cards.

Collect the cards and have the school mail them just before the date the class determined. Students should receive their postcards and reflect upon their progress.

Personal goal setting needs to be an ongoing part of each student's classroom experience in order to prevent "drifting." You may wish to help students set some class goals that are more short term.

Calculator Activity

Materials:

- calculators (1 per student or 1 per pair of students)

How:

See the WEEK-BY-WEEK ESSENTIALS. Introduce calculators to your class and establish any procedural rules you wish. Be certain to provide free exploration time and to ascertain if all students know fundamentals of using a calculator.

This might be an appropriate time to lead a discussion about when one should use a calculator, when mental computation is more appropriate, and its place in your classroom. Check the calculator suggestions in your mathematics textbooks.

School Directions

Materials:

- paper and pencils

How:

Brainstorm a list of places in your school that visitors might need to find; for example, specific classrooms, media center, gym, cafeteria, playground, etc. Using this list, match places to teams of students. Using the skills and information from **Estimating Paces,** Segment Three, teams of students begin at the school office and travel to their destination while noting paces and directional turns. Students should refine their written directions in class.

Discuss how to solve the problem of writing directions for many people who have a variety of length in paces. How could the class package all this valuable information and provide a directory for the school's office staff to use with visitors? Consider all options including making a video.

You may wish to talk informally about writing for different purposes. Since this is an important idea you will revisit throughout the fourth grade, you will want to take time for students to brainstorm different categories and examples for each. This could be the start of a bulletin board which students would design and gradually expand and enrich.

Estimation

Use an estimation idea from *180 Estimation Activites* or design your own.

After students have played *Wipe Out!* a number of times, you might ask them to write in their journals using this prompt:

"When tossing number cubes and adding, the number 7 shows up as the most frequent sum because. . ."

Lesson Plans: Segment Five

Homework Sharing

Materials:

- student homework products

How:

Use a similar approach to that of other days.

Discussing A Question: Sharing Our Opinions

Materials:

nothing special

How:

Divide the class into the groups of four used in Segment One. Have groups pick someone to record their discussion (recorder) and someone to report to the rest of the class about their discussion (reporter). Introduce the question and allow students a reasonable amount of time to discuss. Circulate during the discussion to make sure everyone is getting involved and to sense when the class is ready to report.

While students are reporting, each student is responsible for listening, indicating agreement, disagreement, or lack of understanding of someone's explanation. All student's contributions need to be valued and validated.

Revisiting Our Names

Materials:

- line plots generated in Segments Two and Three
- large paper for stem & leaf plot
- marking pens

How:

Review the process used to create the line plots of the numbers of letters in the classes first and last names. Explain that later in the lesson students will take this same data and show it in a different way. Use the number of letters in the names of the seven continents again to model how to create a stem and leaf plot.

Stem and leaf plots are similar to line plots. They help students organize data with the tens as the "stems" and the ones as the "leaves". Notice that the data are ordered within each decade. Stem and leaf plots work best for data with a range of several decades. It is easy to see clusters of data with this type of display .

Letters in Names of Continents

0	4 6 6 9
1	2 2

Now students get into groups and make stem and leaf plots of the names data. Lead a discussion about which graph, line plot or stem and leaf, "best" represents this data. What can you tell by reading a stem and leaf plot that is different from a line plot? Discuss if the stem and leaf plot would be more interesting if students plotted first and last names together. For example, Doris Finklehofer has 16 letters and Julianne Morris has 14, but Sue Kim has 6. Students may want to look at the Census Sheets they completed in Segment Four and discuss what kinds of graphs would best represent the data gathered from the various questions.

Notes: Some students will be interested in further study of the question "How long is the typical last name?" They may want to do some data collection using the local telephone book. Ask them to prepare a plan for how they will proceed before beginning their investigation.

Time Zones

Materials:

- *map of 24 time zones
- *detailed map of the 6 time zones of the United States
- *globes
- *large playground ball
- *flashlight

How:

Review the placement of the Prime Meridian and International Dateline. Use the playground ball to mark this division with masking tape or markers. Continue by adding the time zone lines and using the flashlight to demonstrate a.m. and p.m. Students might be able to identify some of the time zones on their small globes from Segment Two.

Have students work in pairs to solve the following problems:

*John lives in North Carolina where it is 4 o'clock p.m. What time is it in Colorado where his friend Tom lives?

*The Rose Bowl Parade begins in California at 2:30 p.m. What time should Sue plan to watch it on television in Florida?

*It is 11:15 a.m. in Nevada. Is it earlier or later in Hawaii? How do you know?

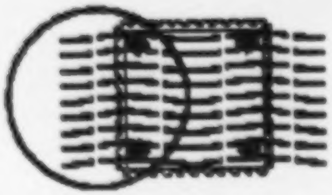
*Alice lives in New Mexico. She would like to call her grandmother in New York before she leaves for work at 7:30 a.m. What time will Alice need to call according to her own watch?

*Sam gets on a plane in Oregon at 4:00 p.m. How will he need to adjust his watch if he flies to Ohio?

*Your aunt lives in South Dakota. Explain what kinds of problems you might have trying to contact her during working hours.

Note: This is another opportunity for assessment. You might write a time on the chalkboard, announcing that this is the present time in your location, and ask students to write what time it would be in various parts of the country as you name locations. Maps in the free magazines in airplanes show clearly the time zones and major cities.

Philately



Materials:

- *stamps in rolls, pages, and books for illustration
- *pictures of pages of stamps (see blackline masters)
- *scissors

How:

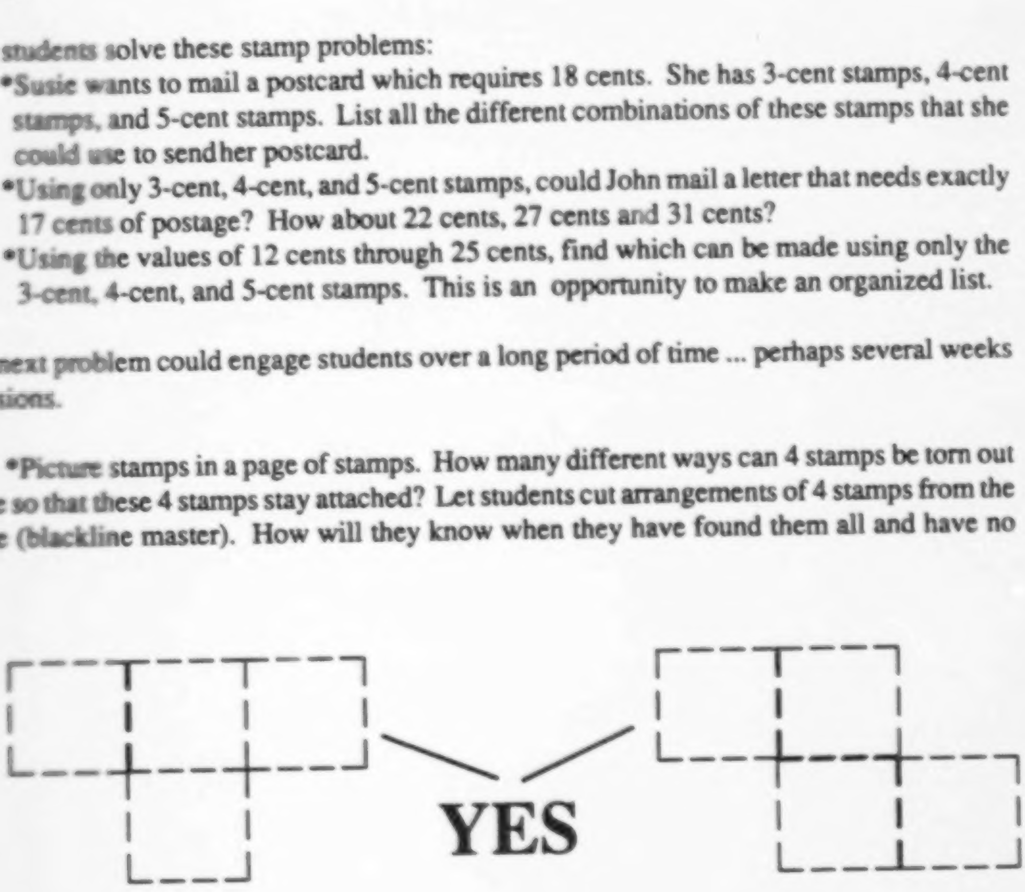
Discuss the word "philately." You might want to invite a philatelist in to share his or her collection. Show students some stamps sold in different ways; rolls, pages, books from machines. You might want to invite someone from the post office to share information about how mail is handled or the history of postage charges, which are about to increase again. Consider having students interview persons who are interested in stamp collecting (philatelists, hobby shop salespesons, postal workers, etc.)

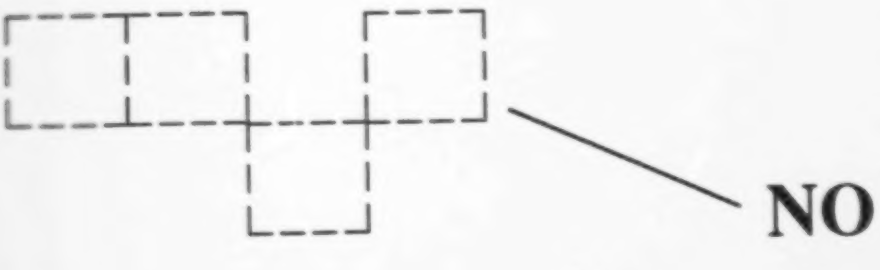
Have students solve these stamp problems:

- *Susie wants to mail a postcard which requires 18 cents. She has 3-cent stamps, 4-cent stamps, and 5-cent stamps. List all the different combinations of these stamps that she could use to send her postcard.
- *Using only 3-cent, 4-cent, and 5-cent stamps, could John mail a letter that needs exactly 17 cents of postage? How about 22 cents, 27 cents and 31 cents?
- *Using the values of 12 cents through 25 cents, find which can be made using only the 3-cent, 4-cent, and 5-cent stamps. This is an opportunity to make an organized list.

This next problem could engage students over a long period of time ... perhaps several weeks with extensions.

*Picture stamps in a page of stamps. How many different ways can 4 stamps be torn out of this page so that these 4 stamps stay attached? Let students cut arrangements of 4 stamps from the stamp page (blackline master). How will they know when they have found them all and have no repeats?





Lesson Plans
Segment Six

Game of the Week

See WEEK-BY-WEEK ESSENTIALS

Also consider revisiting games from Segments One through Five.

Pie Border

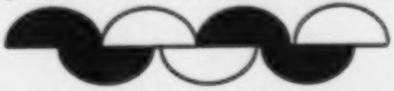
Materials:

- *large circle dots from stationery store in two colors or construction paper in two colors and circular lids to trace
- *scissors
- *waxed paper if using circle dots, glue if using construction paper
- *adding machine tape

How:

Students will be creating a bulletin board border by combining parts of circles in different ways. Students need to cut many half circles either by cutting circle dots along the diameter or tracing a circular lid onto construction paper to cut out and then cut in half. Let students find their own strategies for cutting circles in half. Discuss how this relates to lessons from Segments One through Five.

Have students experiment to create different patterns with two colors of half circles. Circle halves should be matched along straight edges.



Then have students cut each half to create fourths. Using fourths, and lining pieces along straight edges again, have students create more patterns. Limit students to two different colors at this point. If you've decided to use circle dots, students can move their pieces around on strips of waxed paper, peeling them off and moving them as desired. When students are satisfied with a pattern, have them paste them down on adding machine tape. They'll be using this activity to create a border for the North Carolina bulletin board, see "Our Walk Across the State". You might want to discuss the various patterns in terms of A, B sequencing (ala Math Their Way).

Have students write about the patterns they explored in their journals (learning logs).

North Carolina Road Map

Materials:

- *North Carolina road map (1 per group, free from NC Dept. of Transportation)
- *paper and pencil

How:

Have students get into their groups of four and distribute the North Carolina road maps. Give students time to explore the map and make a list of all the different types of information they can find on the map. For example; mileage charts, background information, etc. Have groups share their lists.

Lead a discussion about the legend and meaning of all the symbols. Practice locating cities. You name a city and see how quickly groups can find it. Have students name something to find while the others in the group search.

Transportation

Materials:

- *Student Census sheets
- *large paper for graph representations
- *marking pens
- *math books

How:

Using the student census sheets, list the data referring to how students usually come to school. Locate samples of picture graphs in the math book to provide yet another option for representing data. Review the line plots and stem and leaf graphs from previous days. Have students work in groups to first decide which type of display is most appropriate for the data about how students usually come to school. Then they should create the data display they have decided upon. Groups post their graphs and explain why they chose that particular type of display.

Homework:

Find several different kinds of graphs or data displays at home in a newspaper or magazine. After checking with their parents for permission, students cut out these graphs and bring them to school the next day.

Math is Important Because

Materials:

- *paper and pencil

How:

Have students complete this sentence in as many different ways as possible: Mathematics is important because ...

Note: This would be a good writing activity to include in their journals. Students can share what they have written in small groups and then report to the entire class. Save these sentences for later expansion and display.

Daily Estimation Activity

See *180 Estimation Activities* or have a student committee help to plan the estimation for the next week or so.

Lesson Plans: Segment Seven

Homework Sharing

Materials:

- students' homework graphs

How:

Have students get into groups of four and share the graph they brought from home. Students should discuss what kinds of data are represented, appropriateness of representation, and conclusions that could be drawn from the graphs. Each group could select its favorite to share with the class.

Mental Math

See WEEK-BY-WEEK ESSENTIALS. Also consider using those questions written by students in Segment Two for homework.

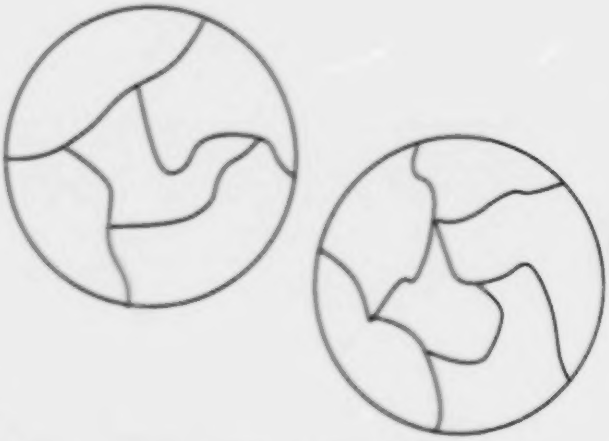
Circle Puzzles

Materials:

- construction paper
- circular lids of various sizes
- scissors

How:

Review the method used in Segment Six to trace circular lids to create construction paper circles. Students cut each circle into three to six parts to create a puzzle. Students take turns solving each others puzzles. Lead a discussion about what made puzzles easier or more difficult.



Students can create review puzzles by writing the same number in different forms on each piece. For example, one puzzle could have pieces labeled 4000 + 20 + 3, four thousand twenty-three, 4023, (4 x 1000) + (2 x 10) + (3 x 1), 100 more than 3923. Or students could write phrases which describe a historical site or event. For example, a puzzle could have these phrases: capital of the state, named for Sir Walter Raleigh, location of North Carolina State University, county seat of Wake County, where the legislature meets. The North Carolina Almanac and Book of Facts would be an excellent resource for all activities, especially Segment Seven.

Have students brainstorm other ways to create construction paper puzzles. For example; start with different shapes and put pieces for two puzzles together in the same envelope, etc.

Homework:

Create a new puzzle to share, use one of the variations discussed.

Population War

Materials:

- *index cards (10 per student)
- *maps of North Carolina and social studies books
- *population figures for major cities in North Carolina (1990 census) from your textbook or the North Carolina Almanac

How:

Have students work in their groups of four to locate ten major cities in North Carolina. Each student writes the names and populations of the selected cities on index cards; one city per card. Discuss the census process and the role of estimation in reporting populations. Have students round each population figure to some "reasonable" number. Allow them to make other cards for the towns that interest them.

Student mix up their cards and play a game of "war" with a partner. Each student turns up a card and the one turning up the highest number wins both cards. The final winner is the one with the most cards. Brainstorm some variations for this game and let students try some of the "new" games.

What is a City?

Materials:

- **Flights* basal reader, *Cricket in Time Square*
- *paper and pencil

How:

Read the Flights selection which describes a city. Brainstorm a list of criteria related to "defining" a city. Have students write a short paragraph answering the question, "What is a city?"

Working with a partner, students proofread each other's paragraphs and provide postitive feedback. Before beginning this process, you might want to lead a discussion about what makes a good paragraph.

Compare the way authors develop their articles. Discuss audiences. Brainstorm what cities are like. Teams could write a description or fictional account that could give a feel for what different parts of cities can be like.

You might consider using the book CITY by David Macaulay, Dale Seymour Publications.

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Lesson Plans:
Segment Eight

Homework Sharing

Materials:

- *students' homework products

How:

Have students share their puzzles in small groups. Everyone in the group should try to solve every other student's puzzle. Lead a discussion about what variations students chose to use for creating their new puzzles. Was there a more popular approach? All of these puzzles could be organized into a "Puzzle Center."

Problem of the Week

See WEEK-BY-WEEK ESSENTIALS

Homework: students create their own designs using rectangles or squares with the challenge of finding the total number of shapes.

Crossing the State

Mateials:

- *North Carolina road maps
- *pushpins
- *drawing paper, crayons, scissors
- *string and rulers

How:

Group students into pairs, threes, or fours. These groups or "teams" will be planning a trip across the state using different routes. Help students read the mileage table on the North Carolina roadmap to find that the trip from Manteo to Murphy is basically 543 miles. Assign these various routes to student teams:

Manteo, Fayetteville, Murphy
Manteo, Greenville, Asheboro, Murphy
Manteo, Kinston, Murphy
Manteo, Rockingham, Murphy
Manteo, Charlotte, Murphy
Manteo, Wilson, Asheville, Murphy

Each team uses the road map to plan its route, locating places to stop, estimating the number of miles between stops, and writing out a travel itinerary. Prior to this planning session, students will need some ideas about reasonable travel distances per hour in cars, and reasonable travel times in terms of hours per day.

Teams should share their routes with the class by describing the route as others follow along on their own road maps. You may wish to expand this map study and have students start to gather information they will use later in the year. Have the class write a business letter to Chambers of Commerce (addresses in North Carolina Almanac) for information about cities, brochures, or copies of the newspaper. They might write to editors of newpapers what they might like to visit in the town or area. Consider corresponding with fourth graders in the elementary schools in these towns.

Discussion Question

See WEEK-BY-WEEK ESSENTIALS and proceed in a manner similar to that in Segment Five.

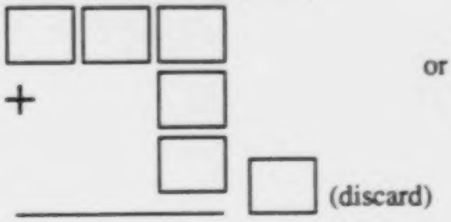
Revisit Target Number

Materials:

- *paper and pencil
- *0 - 9 digit cards (1 set per group) or number tiles

How:

Set up a new matrix. For example:



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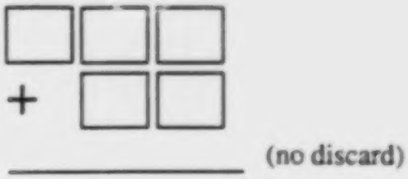


Play this game as described previously. Let students take turns establishing a target number. After a few times, change the operation to subtraction.

> Student-made bulletin boards tell the tale of interesting explorations and student creativity. Whether you choose geometry, classification, problem solving or data activities, having students write about and illustrate mathematics lessons increases student interest in the topics.

Lesson Plans: Segment Nine

Homework Sharing

Proceed in a manner similar to Segment Seven.

Vacation Land

Materials:

- *blank county maps of North Carolina
- *social studies books, travel brochures
- *North Carolina road maps

How:

North Carolina is known as the land of vacations. The class is going to plan vacations in the varied regions of North Carolina. Familiarize students with the regional divisions of the state. Have students identify these regions on a North Carolina map. Read about and discuss the land forms in North Carolina's three regions. How will the land forms affect what each is able to do on vacation?

Divide the class into groups of four. Put the names of the regions into a bag (Coastal, Piedmont, Mountain), and have each group pick a region from the bag. Each group chooses a vacation spot in that region, using the assistance of the county map divided by regions and the North Carolina road map. Each group is responsible for writing out a travel itinerary, including distances traveled from home, sightseeing on the way, and a list of travel needs. (If time permits, have students estimate the costs for their trip, showing expenses such as food, gas, etc.)

Have groups share their plans with the class. Take a survey to find out who in the class has actually taken any of these vacations. Collect this data by tallying on a NC map divided into regions. Have each group write several statements about this data.

Writing Fictional Accounts

In their journals, have students write about where they went or would like to go on their dream vacation. Or have them write about "The vacation that turned into a nightmare."

The Value of Maps

Materials:

- *various maps used and created during the past days

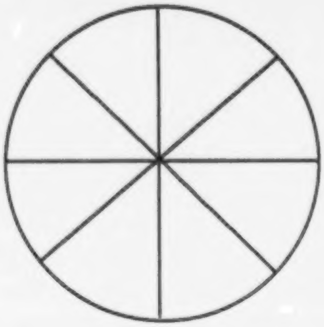
How:

Brainstorm a list of ways maps have been used during the past 8 days. Using this list, each student will respond to the prompt "A map is a valuable tool because. . ." Consider having students work in pairs to proofread and improve upon paragraphs.

Calculator Problem of the Week

See WEEK-BY-WEEK ESSENTIALS

Circle Pattern Search



Materials:
- *eighth circle pattern (see blackline masters)
- *crayons

How:

Challenge your class to find all the possible ways to color a circle that has been divided into eighths with two colors. One circle is considered to be colored the same as another if the two circles can be rotated (turned) to look the same. You might want to encourage students to use a systemic approach. How many ways can one eighth be colored? How many ways can two eighths be colored? If students develop a table recording this information as they proceed, they may find an interesting pattern which will help them decide when they have found all the possibilities. By the way, there are more than thirty.

Homework

Have students find a circular lid or lids at home. Have them trace the shape or shapes to create a design and then color it.

You may wish to write for booklets such as "North Carolina Variety Vacationland" from:

North Carolina Division of Travel and Tourism
Department of Commerce
430 North Salisbury Street
Raleigh, NC 27611
or call 1-800-VISIT-NC.

Another resource would be a catalog that describes more than 150 North Carolina related publications that is now available free of charge from the Historical Publications Section of the North Carolina Division of Archives and History. To receive a copy, write to:

Historical Publications Section
Division of Archives and History
Department of Cultural Resources
109 East Jones Street
Raleigh, NC 27601-2807
or call 919-733-7442.

Lesson Plans:
Segment Ten

Homework Sharing

Materials:

- students' homework products

How:

Provide space for students to post their designs. Lead a discussion about how the designs might be categorized. Give students opportunities to group the designs according to these categories and label them. These designs might be regrouped in different ways on future days.

County Classification

Materials:

- blank county maps
- crayons or markers
- social studies books
- county census report

How:

Review locations and names of the 100 counties. Divide class into teams. Place the names of the counties into a bag and have teams take turns drawing names until all the names have been taken. Teams will race to identify and mark on the blank county map as many of their counties as possible in 25 minutes.

Give students population figures by counties. You want to rank counties by population from largest to smallest. This is a big job for 100 counties. Brainstorm to come up with a plan for accomplishing this task. Have students work to represent this data in some kind of graph format that will illustrate this ranking. What kind of data representation would be most useful? Considering both county location and county population, what kinds of generalizations can be made? While some students are working on the task above, others could be researching how the counties got their names. Their findings could be later displayed on the North Carolina bulletin board.

County Concentration

Materials:

- social studies books and NC maps
- index cards (20 or more for each pair)

How:

Students will make cards for a concentration game. Using books and maps, students will identify the county seat for some large counties. They will write the name of the county on one card and the name of the city in which the county seat is located on another. For example;

card 1	**card 2**
Buncombe County	Asheville
Cumberland County	Fayetteville
Forsyth County	Winston Salem

Then students use these cards to play a classic game of concentration.

Home Sweet Home

Materials:

- *social studies books and maps
- *paper and pencils
- *crayons

How:

Students brainstorm ideas that might be included in a travel brochure for the county in which your school is located. This list should include all the information that a visitor might need; i.e., recreational areas, special buildings, shopping opportunities, restaurants, historical sites, etc.

You might consider showing students some sample travel brochures. Have students work in small groups to create their own travel brochure about their county or allow them to create the radio or TV commercials or a newspaper ad. Talk about what makes a brochure "inviting" (pictures, easy reading, etc.) and encourage students to include these features in their brochures.

You might want to contact teachers from other counties in the state and ask them to exchange student created brochures about their counties. This could be very helpful with developing the bulletin board of "Our Walk Across the State," see suggestions in this section. Your school has a state directory which includes the names and phone numbers of all the schools in the state.

In the process of writing these brochures or commercials, students might be encouraged to find some mileages: mileage from your town to the county seat, mileage from your town to the nearest recreation area, mileage across the county both north to south and east to west.

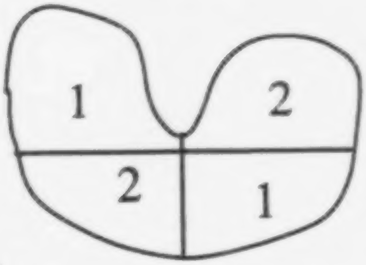
Classic Map Problem

Materials:

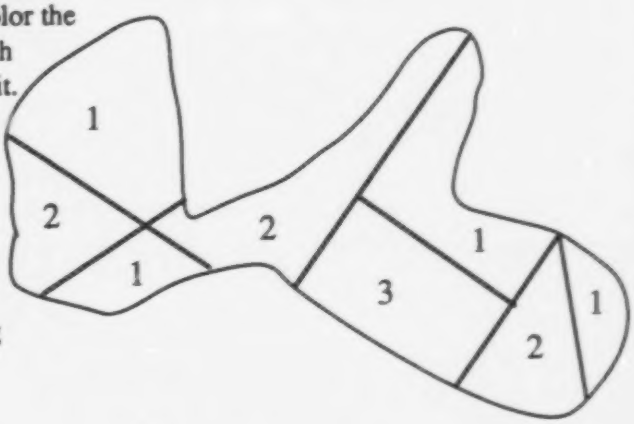
- *blank North Carolina maps with counties
- *colored pencils or crayons

How:

For many years, mathematicians have been trying to prove that any map could be colored with a certain number of colors in such a way that any adjoining areas are different colors. Areas on the map are adjoining if they share a border. Have students discuss this in small groups and make a group guess about the number of colors needed to accomplish this. Tell the class that you can color the county map with four colors and still have each county a different color from those bordering it.



Have students work in pairs to see if they can meet this challenge. You might want to lead a discussion about various strategies for working on this task, i.e., trial and error, using numbers to represent colors until the task is accomplished to avoid erasing large areas of color or starting over.



Challenge students to draw a map that requires 5 colors or more to meet the guidelines. They should exchange their maps for field testing until students are convinced that they have such a map. *(Actually, there is no such map, but you don't need to tell the class that; just keep proving that the map can be colored in 4 colors. Some are challenging, but you can do it! This activity will engage students and keep their minds in motion for a very long time.)*

What Am I

Materials:

- •cards with vocabulary words (1 per student)
- •masking tape

How:

Pick a list of vocabulary words that have been studied for the past 9 days. For example: coordinates, sphere, grid, factors, graph, hemisphere, latitude, compass, equator, continent, atlas, globe, etc. Write each word on a separate index card, or piece of paper. Each student will have one of these words taped on his or her back and try to determine what the word is by asking questions which can be answered by "yes" or "no."

Before actually taping the words on students' backs, lead a total class practice of asking questions which can be answered with "yes" or "no." Tell the class that the words will be from their vocabulary in social studies and mathematics.

Students will be moving about the room, asking questions of many others. There is no limit to the number of questions that can be asked, but students are to figure out their words as quickly as possible. When students have discovered their words, they may remove it from their backs.

WE LIKE CALLING NORTH CAROLINA HOME

"We Like Calling North Carolina Home" is a year-long project for your classroom which incorporates displays (centers) and a working bulletin board. The possibilities are limitless; the suggestions which follow are "idea starters."

Fourth grade teachers in your school may wish to plan together to have different student groups set up displays which travel from one classroom to another. These might be classified as museum displays (example, North Carolina crafts, authors, pottery) or tourist promotionals (examples, vacation spots, historical sites) or North Carolina businesses and industries (example, agriculture in North Carolina, the furniture industry). Several lists are included in this section for you to use in these projects.

Walking Across North Carolina

N.C. bulletin board project #1

This activity is designed to last all school year and to be a part of the ongoing bulletin board display. Students will be estimating and recording mileages, walking miles at the school, and tracing routes on the North Carolina road map.

Begin by asking students to estimate how far they might walk during the school year if each student walked a little every school day and the number of miles walked were computed for the entire class. For example, each student walks 1/4 of a mile on day 1, and there are 26 students in the class, then the class has walked a total of 6 miles for that day. Who thinks we might be able to cross the state? Who thinks we might make a round trip? Who thinks we might not get across the state? Ask for volunteers to determine the distance across the state while the rest of the class continues the discussion with you.

Ask students how the class might go about marking off a mile or part of a mile somewhere on the school grounds. What kinds of information are needed? For example, it might be nice to know that there are 5,280 feet in a mile. (You may already have an area marked off; however, deciding how to solve this problem and carrying out the measurements are important and appropriate tasks.) Choose one of the strategies suggested and actually mark off the distance. You might want students to work in teams using different strategies and compare the results.

Have someone cut out North Carolina from one of the road maps and attach it to your bulletin board. Tell the class that they will be taking an imaginary walk across the state from Manteo to Murphy (a distance of about 540 miles). Have other students create a chart so that after each walk, students will record how far they walked. The class total can be calculated weekly in terms of miles. You might want to use a pushpin to indicate the class location on the road map, glue yarn on the map to trace various routes, or use a marker if one route is being followed. At different times you may want to offer an incentive for reaching certain goals (new pencils, a field trip to a local historical site, the chance to try a North Carolina recipe that results in a treat, etc.).

If your class does complete a trip across the state, plan a return trip taking a different route. See just how far you can walk. At various intervals, have the class adjust their estimates about the time it will take for this walk based on the new information they have gathered about how far the class is walking daily and perhaps weather considerations.

ON-GOING DATA GATHERING ACTIVITIES

Fourth graders will enjoy gathering information about a variety of topics and should learn to keep accurate records. They need to learn to formulate questions and decide where to get the information they want. They need to gather, organize, and display the information. They need to compare different data displays and evaluate which is most appropriate. You may wish to begin compiling a list of investigations that relate specifically to your North Carolina studies. Test taking skills may be improved by having students write questions about charts and graphs in their texts.

Variety Vacationland

N.C. bulletin board project #2

North Carolina is known as the "Variety Vacationland". Have the class make a list of places to visit in the state. Sometimes these places will be along the walking route and you can coordinate the "sightseeing" with the trip across the state. Other spots will not be along your trail and will best correlate with your study of the state's history. A book about historical markers, available from the Museum Gift Shop in Raleigh is a helpful resource. (*Historical Markers*, Museum Gift Shop, Archives and History, State Library Building, 109 East Jones Street, Raleigh, 27601-2807, telephone 919-733-3200). Local travel agents, highway visitors' centers, and the Chamber of Commerce are other resources for students to contact. Letter writing may fit into your instructional program here.

Brainstorm a list of topics to gather information about each place (for example, recreation opportunities, sightseeing opportunities, temperature ranges, average rainfalls and snow accumulations, celebrations and festivals, historical sites). Discuss what information people like to have when they visit a new place.

Divide students into teams of two or three to research a vacation spot. Each team will then create a flyer such as a travel agent might use, or write a radio or newspaper advertisement, and design a "billboard" advertising their area. For example, if you travel to Asheville, a team might post a billboard advertising a visit to Biltmore House. The billboards can be arranged on the North Carolina bulletin board throughout the year and the tourist information displayed. Teams might decide to create more elaborate displays to allow them to feature historical events, current industries or products, or other information.

This project will allow you to combine writing instruction with the social studies content in a creative manner. Be sure to provide materials for students to include art work in their products.

Partner Classroom

N.C. bulletin board project #3

Is there a classroom in another part of the state that would match ours? What would we want to match - size of school and town, recreation and sightseeing opportunities, primary income opportunities? Or would we like to find a very different classroom with whom to correspond? Consider adding a new dimension to your study of North Carolina by finding a partner classroom and corresponding with them throughout the year. You can exchange pictures, letters, information about your area, and data your students collect throughout the year.

Begin by having students brainstorm what they would like to find out about their area, how and where they will gather the information, and who will be responsible for each task. Let the class decide in what part of North Carolina they would like to find a partner class. You can locate names and telephone numbers of schools in the *N.C. Educational Directory* in your school office. The possibilities for the project are endless! Make a place on your N.C. bulletin board to display your partner classroom (letters, pictures, and data). Exchange videos with your students as producers.

Pattern Borders and A Public Service Campaign

N.C. bulletin board project #4

Groups of students may be responsible for making borders for the bulletin board and changing them each month. The first border may use the circle designs from day 6 of the two week lesson plan section. Other borders could feature different types of patterns. Adding machine tape is an ideal size for a border. You might talk with the art teacher about helping students create templates for stenciling, make block prints, or use other production processes. If all of your students are enthusiastic about creating these linear patterns, use the borders on hall bulletin boards as well as in the classroom. Students need to be able to identify the pattern unit that is being repeated. Some students may wish to create numerical patterns that focus on two steps such as "multiply by 3 then subtract 3".

Along with the shared responsibility for changing the bulletin board border, establish a schedule for groups to add a statewide public service campaign promoting the importance of math. Going back to the writing assignment from day 6 of the two week lesson plans about the importance of math, groups could take turns creating bumper stickers with math slogans. The slogans could be one large display or a series of smaller signs like the old Burma Shave ads. (For those who are old enough to remember them!)

Daily Weather Watch

N.C. bulletin board project #5

Rotate students weekly in being responsible for maintaining the daily weather watch. Students will post the temperature at a given time each day (1 pm) and write a one sentence weather report. A laminated piece of oak tag or other sturdy paper and an overhead pen should be permanent parts of the weather watch station.

Students should also update a monthly weather log which uses a double line plot to record high and low temperatures from the previous day. Plan ahead so that students know when they are responsible for gathering this data and will be able to get the information for Friday and Saturday as well as Sunday when they record the data on Mondays. As the year progresses, compare the monthly charts to talk about trends in the data. Ask more open questions such as "In which months is there likely to be less demand for electricity?"

We Like Calling North Carolina Home!

Daily Weather Chart

N.C. Story

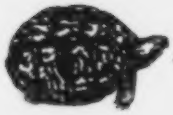
News from across the State

Math Makes Me Smile!

Public Service Announcement

Have you visited the ZOO?

Variety Vacationland



N.C. Story of the Week

N.C. bulletin board project #6

Fourth graders need practice reading large numbers within many different contexts. Students working with partners may take turns writing stories about North Carolina topics in which numbers give factual information. Stories may be historical, geographical, or current events. During the week you might ask students to turn numbers into number words and vice versa. For example, here is one about Roan Mountain.

> On the border of North Carolina and Tennessee is a small mountain range called the Iron Mountains. The highest point is called Roan Mountain. It is **6,285** feet above sea level. The Roan Mountain Gardens are **thirteen** miles north of Bakersville, off highway **261**.
>
> In **1885** the Cloudland Hotel was built with **166** rooms for travelers who arrived by stagecoach. The hotel is no longer there, but there are still **600** acres of rhododendron gardens and **850** acres of fir and spruce for hikers to enjoy.
>
> Nearby is Grandfather Mountain. It is **5,964** feet tall. The tallest mountain in the eastern part of the United States is also close to Roan Mountain. Mt. Mitchell rises **6,684** feet above sea level.

Total Grade Projects

N.C. bulletin board project #7

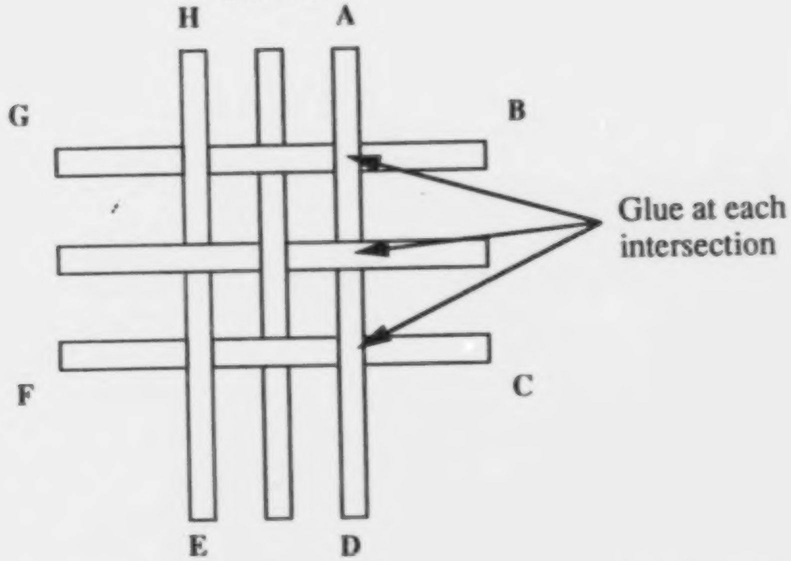
Fourth grade teachers may wish to plan together to have different student groups set up displays which will travel from one class to another. These might be museum displays (such as North Carolina crafts, pottery, or authors) or tourist promotionals (such as vacation or historic sites) or North Carolina businesses and industries (agricultural, furniture, textiles or research facilities). Several lists are included in this section to give you more ideas.

CAROLINA STAR

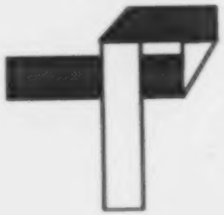
This is a two-day project because the strips need to be glued in step 4 and the glue needs to dry before step 5. You will have an 8-pointed star when you finish.

Step 1. Cut 12 strips of stiff paper that are 1/4" x 11" long (cardstock works best).
Step 2. Place 3 strips side by side with an equal amount of space (about a centimeter) between each strip.
Step 3. Weave 3 more strips with the first 3. Label in this manner:
Step 4. Do the same thing with the 6 other strips. Glue all intersections.

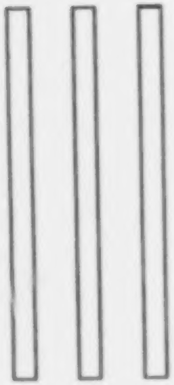
STEP 3



Step 4
Step 5



STEP 2



Step 4. Take "A" in your left hand, "B" in your right hand. Lift each strip and turn face down and glue at right angles. Repeat: C,D; E,F; and G,H. Repeat for other set of strips.

Step 5. Place the sets of 6 strips face-to-face with each other. Next, rotate one piece 45^0. Slip the ends of the single strips inside the folded points, trim as needed, and glue the middle strips onto an existing point .

Bulletin Board Project Idea Lists

National Forests

Croatan - Jones, Craven, Carteret Counties
Nantahala - Cherokee, Clay, Graham, Jackson, Macon, Swain, Transylvania Counties
Pisgah - Avery, Buncombe, Burke, Caldwell, Haywood, Henderson, Madison, McDowell, Mitchell, Transylvania, Watauga, Yancey Counties
Uwharrie - Montgomery, Davidson, Randolph, Stanley Counties

Rivers

Hiwassee - Hiwassee Lake
French Broad - Transylvania County
New - Watauga, Ashe, Alleghany Counties - flows north
Catawba - McDowell County
Yadkin - Watauga, Wilkes Counties
Uwharrie - Randolph County
Pee Dee - Montgomery County
Deep - Guilford County
Haw - Forsyth County
Neuse - Durham County
Tar - Person County
Cape Fear - Harnett, Cumberland, Bladen, Pender, New Hanover, Brunswick Counties

Lakes

Lake Waccamaw - Columbus County
Lake Mattamuskeet - Hyde County
Kerr Lake - Vance County
Lake Gaston - Warren County
Falls Lake - Wake County
Lake Norman - Lincoln, Catawba, Iredell, Cabarrus Counties
Jordan Lake - Chatham County
Fontana Lake - Graham, Swain Counties
Lake Hiwassee - Cherokee County

National Parks

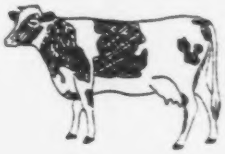
Guilford Courthouse National Military Park - central Guilford County
Moores Creek National Battlefield - first battle of the Revolution - located in Pender County
Wright Brothers' National Monument - Kill Devil Hills - first airplane flight

Museums

Asheboro - North Carolina Zoological Park
Asheville - Folk Art Center - Mile Point 382 - Blue Ridge Parkway
Atlantic Beach - Ft. Mason State Park (Civil War artifacts)
Bailey - Country Doctor Museum - 18th and 19th century pharmacy instruments
Beaufort - North Carolina Maritime Museum
Burlington - Alamance Battleground State Historic Site - NC Highway 62
Chapel Hill - Morehead Planetarium
Charlotte - Charlotte Nature Museum, Discovery Place, Mint Museum
Cherokee - Museum of Cherokee Indians
Creswell - Somerset Place State Historic Site
Durham - Bennett Place State Historic Site - Civil War Museum; Museum of Life and Science
Gastonia - Schiele Museum of Natural History
Halifax - Historic Halifax State Historic Site
Manteo - Elizabeth II - State Historic Site - Ft. Raleigh National Historic Site
Pinehurst - World Gulf Hall of Fame
Raleigh - Mordecai Historic Park, Archives and History Museum
Sanford - House in the Horseshoe - State Road 1644 - Site of Revolutionary War skirmish
Spencer - Spencer Shops State Historic Site - Transportation museum - 55 acre park
Wilmington - USS North Carolina Battleship Memorial - Cape Fear River-Eagle Island
Winston-Salem - Bethahara Park, Museum Early Southern Decorative Art; Museum of Man-Wake Forest University; Nature Science Center, Reynolda House

Festivals and Events

September
- Pony Penning - Cedar Island - Carteret County
- Square Dance Fun Fest - Fontana Dam - Graham County
- Carolina Street Scene - Winston- Salem - downtown outdoor festival
- Soybean Festival - Clayton/Johnston County
- Festival in the Park - Charlotte
- Hang Gliding Championship - Linville - Avery County
- Fiddlers' Convention - Mount Airy/Swain County
- Mule Day Celebration - Benson - Johnston County



October
- 500 Stock Car Race - Charlotte
- 500 Stock Car Race - Rockingham
- Eastern North Carolina Bluegrass Festival - Angier
- Autumn Leaves Festival - Mt. Airy
- Tahasso Festival - Bladen County
- North Carolina State Fair - Raleigh

November
- Rock Fish Rodeo - Elizabeth City
- Piedmont Crafts Fair - Winston-Salem
- Flue-Cured Tobacco Festival - Greenville
- Davie Craft Fair - Mocksville

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December

- Christmas in Old Salem - Winston-Salem
- Old Wilmington by Candlelight - Wilmington

January

- Old Christmas Celebration
- Field Trials - Pinehurst
- Watauga and Avery County Winter Festival - Banner Elk

February

- Camellia Show - Winterville
- Festival of Contemporary Art - Wilson
- St. Thomas Celebration of Arts - Wilmington

March

- Block House Steeplechase - Tryon - Polk County
- Old Time Fiddlers' Convention - Union Grove, Iredell County
- Fine Arts Festival - Elizabeth City - Pasquotank
- Folk Music Festival - Louisburg - Franklin County
- Greater Greensboro Open - PGA Golf Tournament

April

- Stoneybrooke Steeplechase - Southern Pines
- Artsplosure - Raleigh Arts Festival
- Shark Festival - Grifton - Pitt County
- Carolina Dogwood Festival - Statesville - Iredell County
- Strawberry Festival - Chadbourn - Columbus County
- Triangle Craft Festival - Durham

May

- World 600 - Charlotte
- Aulander Day - Aulander - Bertie County
- Invitational Mountain Dance - Cullowhee/Jackson County
- "May Fair" - Wilmington - New Hanover County
- Ashe County Arts Festival - West Jefferson/Ashe County
- Hang Gliding Spectacular - Nags Head

June

- Horn in the West (outdoor drama) - Boone
- Dare Days - Manteo
- National Hollerin' Contest - Spivey's Corner
- Unto These Hills (outdoor drama) - Cherokee
- The Lost Colony (outdoor drama) - Manteo
- Singing on the Mountain - Linville - Avery County
- The Liberty Cart (outdoor drama) - Kenansville - 100 years of eastern North Carolina History
- Strike at the Wind (outdoor drama) - Pembroke - Lumbee Indians
- The Sword of Peace (outdoor drama) - Snow Camp - Quakers
- From This Day Forward (outdoor drama) - Valdese - Waldensian settlement in western North Carolina

July

- Listen and Remember (outdoor drama) - Waxhaw - Revolutionary War era

Natural Historic Landmarks

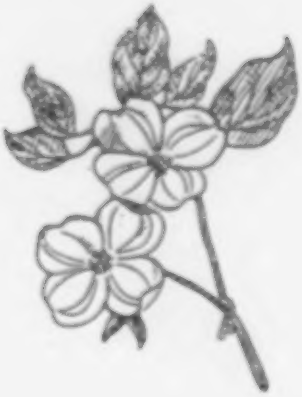
Asheville - Biltmore Estate, Thomas Wolfe House
Bath - Palmer - Marsh House - South of NC 92 - Built 1774 - preserved example of colonial townhouse
Chapel Hill - First state university in the nation; Old East, first building constructed in 1795
Concord - Reid Gold Mine 11 miles southeast of Concord on US 601 and NC 200 - Nugget found here set off first gold rush in United States

Durham - Blackwell Company Tobacco Factory - House of Bull Durham smoking tobacco; Duke Homestead - one half mile north of Durham on NC 1025 - home of Washington Duke
Edenton - Chowan County Courthouse - built 1767 - Edenton was first permanent colonial settlement in North Carolina
Fayetteville - Market House - Patterned after 18th century English town halls
Flat Rock - Connemara - one-quarter mile west of Flat Rock - Home of Carl Sandburg
Hillsborough - Nash-Hooper house - home of William Hooper, signer of the Declaration of Independence - from North Carolina
Mocksville - Hinton Rowan Helper House - home of author of controversial anti-slavery book, The Impending Crisis.
Mount Gilead - Town Creek Indian Mound - 5 miles southeast of Mt. Gilead - ceremonial center for Indians from Mississippian influenced culture
Raleigh - State Capitol - example of Greek Revival architecture
Wilmington - Fort Fisher - 18 miles south of Wilmington on US 421. An earthen Confederate stronghold
Winston-Salem - Old Salem historic district includes Salem Tavern and Single Brothers House

STATE SYMBOLS

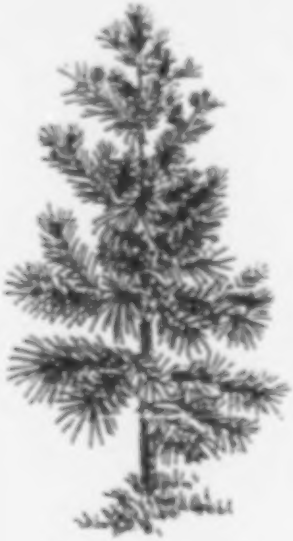
Flowering Dogwood

The Flowering Dogwood (*Cornus florida*), the first state symbol to be chosen, was adopted as the state flower by the General Assembly of 1941. The small, greenish-white flowers are clustered at the center of each group of four large, white bracts, which are often mistaken for petals. Flowering Dogwood grows naturally as a small tree in the understory of our forests, and it is a popular choice for landscaping homes, parks, and roadsides. During fall and winter, many kinds of birds and small mammals eat the shiny red fruits.



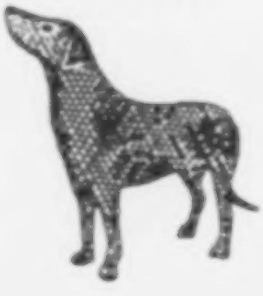
Pine

The General Assembly of 1963, with support from garden club members and other interested citizens, named the pine (*Pinus* sp.) as the official state tree. There are eight native species of pine in North Carolina, but each has a limited range. The Short-leaf Pine is the one most nearly statewide in distribution. White, Pitch, Virginia, and Table Mountain Pines are characteristic of the mountains and western Piedmont. Loblolly, Pond, and Long-leaf Pines are more typical of the Coastal Plain and eastern Piedmont. Pines provide not only food for birds, squirrels, and various small animals, but also lumber, pulpwood for paper making, and resins for varnishes and many other commercial products. Prior to 1900 the production of naval stores such as tar and turpentine was important to the economy of eastern North Carolina.

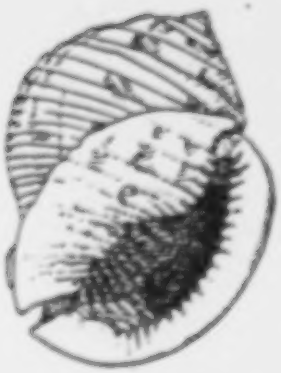


Plott Hound

Officially adopted as the state dog on August 12, 1989, the Plott Hound is one of only four breeds known to have originated in America and the only one that originated in North Carolina. Its name honors Jonathan Plott, who developed the breed for hunting wild boars in the mountains of the state. A gentle and loyal companion to hunters, the Plott Hound has a beautiful brindle-colored coat and a spine-tingling, bugle-like call. Legendary as a tenacious tracker and a courageous fighter, the breed has superior treeing instincts and has long been a favorite with big-game hunters.



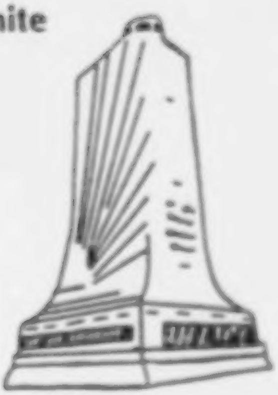
STATE SYMBOLS



Scotch Bonnet

At the request of the North Carolina Shell Club, the General Assembly of 1965 adopted the Scotch Bonnet (*Phalium granulatum*) as our state shell. The choice of the Scotch Bonnet pays tribute to the Scottish settlers in this state as well as to North Carolina's thriving shellfish industry. This shell is produced by a marine snail that lives in shallow water. Large and distinctive in its appearance, the Scotch Bonnet is china white to creamy in color with yellow to brown spiral bands broken into a series of squares. After the snail dies, its shell may be occupied by a hermit crab.

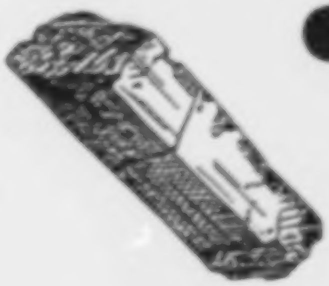
Granite



The General Assembly of 1979 designated granite as the official rock of North Carolina. The 90-acre granite quarry located outside Mount Airy in Surry County is the world's largest open-faced granite quarry. Granite from this quarry has been used to build such well-known structures as the Wright Brothers Memorial at Kitty Hawk, the Education and Justice buildings in downtown Raleigh, and the U.S. Gold Bullion Depository at Fort Knox.

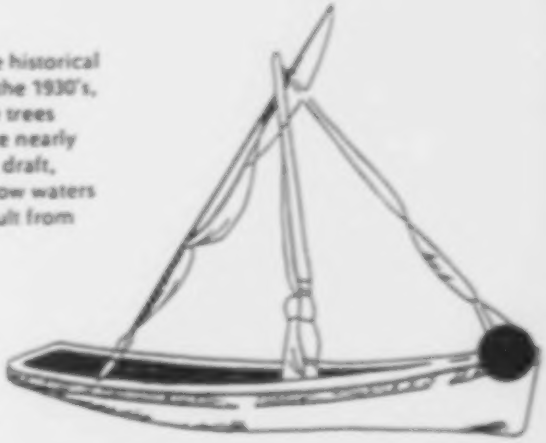
Emerald

The emerald was adopted as the official precious stone by the General Assembly of 1973. A brilliant, transparent form of the mineral beryl, the emerald occurs in nature as a hexagonal crystal with a deep green color and a glass-like luster. In North Carolina, the state precious stone is found most often in Mitchell and Alexander Counties in deposits with quartz, feldspar, mica, and—sometimes—hiddenite. Several large emeralds have been found at Hiddenite, in Alexander County, including a 1,438-carat specimen and, in 1970, the 59-carat "Carolina Emerald." When cut to 13.14 carats, the "Carolina Emerald" was valued at $100,000 and was then the largest and finest cut emerald discovered on this continent.



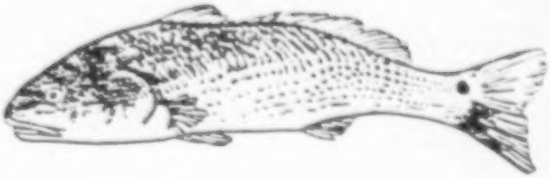
Shad Boat

The shad boat, developed at Roanoke Island, was adopted as the state historical boat in June, 1987. Although production ended during the depression of the 1930's, shad boats were widely used into the 1950's. Well constructed from native trees such as cypress or juniper (Atlantic White Cedar), some shad boats that are nearly 100 years old can still be seen around Manteo and Hatteras. Their shallow draft, speed, and ease of handling made these boats ideal for reaching the shallow waters of Pamlico and Albemarle Sounds, where fishing for shad had been difficult from the traditional small sailing boats.



STATE SYMBOLS

Channel Bass



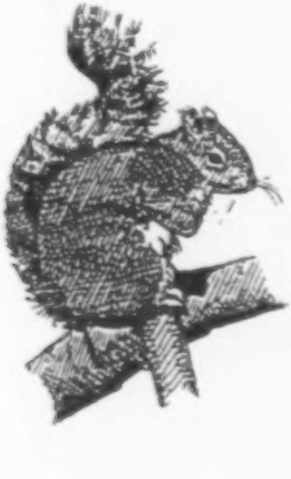
The Channel Bass (*Sciaenops ocellatus*), often called the Red Drum because of its copper-red color, was officially designated our state saltwater fish by the General Assembly of 1971. Each spring and fall, pier fisherman and surf fisherman expect to catch Channel Bass weighing 40 to 50 pounds. Adults may live as long as 30 years, reach a length of 5 feet, and weigh about 100 pounds. These fish spawn in coastal waters near inlets and bays. Wind and water currents carry the newly hatched larvae to nursery areas made less salty by fresh water flowing from rivers. Within 6 to 8 months, the young fish have returned to salt water, and by the age of one year, those that have survived are approximately 12 inches long.

Milk

Milk, often called "nature's most prefect food," was chosen as the official state beverage by the General Assembly of 1967. In dairy production, North Carolina ranks 20th in the nation with nearly 1,000 dairy farmers producing 179 million gallons of the calcium-rich beverage each year. North Carolinians consume more than 143 million gallons yearly. Milk is used to make cheeses, ice cream, and other dairy products.

Gray Squirrel

The Gray Squirrel (*Sciurus carolinensis*) was officially designated as our state mammal by the General Assembly of 1969. Gray Squirrels are statewide in distribution and may be seen in forests city parks, and yards with shade trees. Squirrels build bulky nests of twigs and leaves on tree limbs, but they may also use nest boxes or natural cavities Young are born in spring, and often another litter i produced in summer. These popular game animals often bury acorns and other seeds that may germinate and grow into trees.



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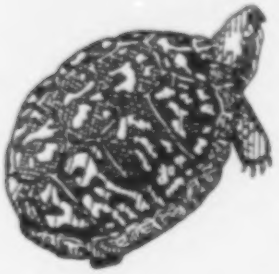
STATE SYMBOLS

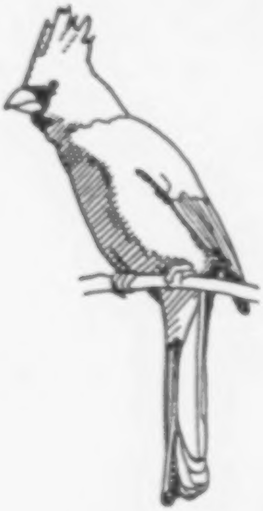
Eastern Box Turtle

The General Assembly of 1979 named the Eastern Box Turtle (*Terrapene carolina*) as the state reptile. This well-known turtle is most common in and near wooded areas. It is frequently seen on roads, where great numbers of them are killed each year by motor vehicles. In most cases, a box turtle does not try to bite when picked up. Instead, it draws in its head, feet, and tail, and closes its hinged shell tightly. Box turtles are mature and capable of mating when 5 years old. Females dig holes in the ground with their hind legs, lay their eggs, and cover them with soft dirt. Hatching turtles dig their way out of the burrow and are able to live on their own without parental help. Full grown at 20 years, box turtles may live for 80 years or longer.



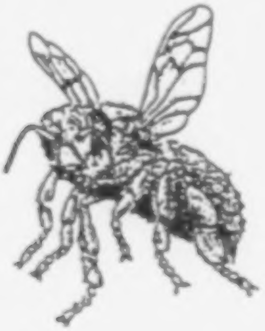
Northern Cardinal

When the selection of a state bird was considered, school children and other interested persons in North Carolina endorsed the Northern Cardinal (*Cardinalis cardinalis*). The North Carolina General Assembly officially adopted the cardinal on March 4, 1943. Permanent residents throughout the state, cardinals nest in woodland margins and residential shrubbery, with first clutches of eggs usually laid before the end of April. The bright red male and the brownish-red female both assist in caring for the young. Two or three broods may be raised each season.



Honey Bee

The Honey Bee (*Apis mellifera*) was adopted as the state insect by the General Assembly of 1973. Not a native species, the Honey Bee was brought to North America by settlers from Europe. Few insects are as steeped in folklore, history, and tradition as is the Honey Bee, and few are as valuable to people. Honey, which bees produce to feed the colony, is a natural sweetener, and beeswax, another product of this industrious insect, is used for making candles and polishes. In the process of gathering nectar to make honey, bees pollinate seed-bearing plants that provide us with food and with fiber for our clothing.



TEACHER TO TEACHER

Words Of Encouragement Collected From Teachers About the Changing Curriculum and A Broader Understanding Of Assessment

"Just as I provide my students with one step at a time, that too must be my strategy for changing my classroom lessons. I must do a little each day."

"My "Assessment Buddy" has shared in my celebrations, failures, and frustrations. We have rejoiced together, given comfort to each other and provided ideas and support in uncertain times. You must adopt an assessment buddy!"

"Approach the assessment with an open mind! Effective changes occur when old beliefs and practices are evaluated in light of new understandings resulting in better methods for students and teachers. A positive attitude eases these transitions."

"Students must feel free to move and to talk when using manipulatives. This will generate some noise. The teacher's responsibility is to maintain a happy, working volume."

"I am convinced that handling concrete objects gives children a mental picture of mathematical concepts, thus providing meaning to otherwise abstract ideas."

"Using manipulatives is not an easier way to plan lessons but is an easier, more effective, and fun way for children to learn mathematics. The instructional advantages reward you for all your effort."

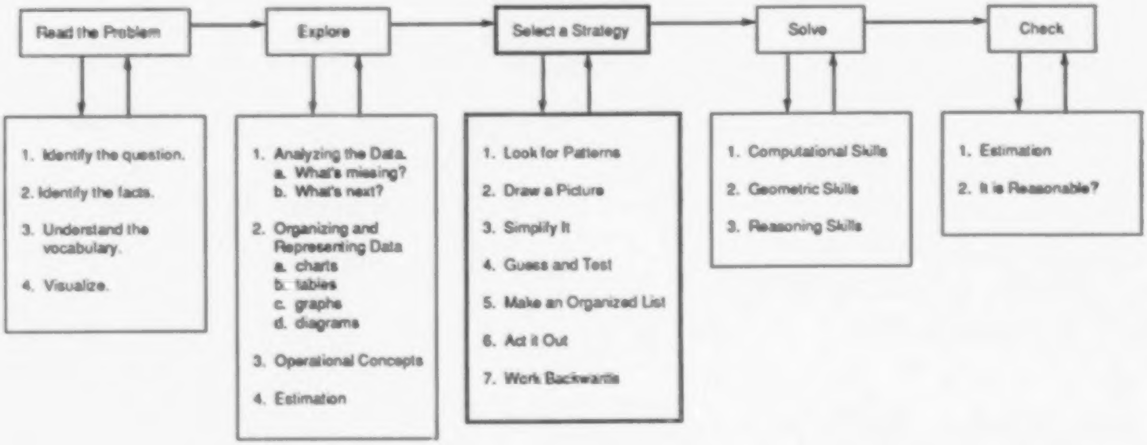
"Each six weeks my students have completed a math log (newsprint pages with construction paper cover) with information that has helped parents know what we have learned and how we have learned it. The logs have helped students and parents to develop a math vocabulary."

"I have had to remind myself that perfection is achieved through practice. Each month has been more natural and my students' portfolios are filling with exemplary work that supports what I have taught and understandings my students have derived from this instruction."

Mathematics for the Future

If students are to achieve in mathematics, then mathematics must make sense to them. Memorizing rules made by someone else and practicing computations which are not in any context does not promote the mathematical thinking and reasoning needed by students to solve new and complex problems. Problem solving should be the central focus of the mathematics curriculum. It should be a primary goal of all mathematics instruction and an integral part of all mathematical activity. **Problem solving is not a distinct topic but a process that should permeate the entire program and provide the context in which concepts and skills can be learned.** Students should share their thinking and approaches with other students and with teachers, and they should learn several ways of representing problems and strategies for solving them. They will learn to value the process of solving problems as much as they value the solutions. As children progress through the grades, they should encounter more diverse and complex types of problems that arise from both real-world and mathematical contexts.

Problem solving is applying knowledge, skills and understanding to an unfamiliar situation in order to reach a solution. As a process, problem solving involves a set of skills which can and should be taught. The chart below illustrates the steps students should go through in solving problems.


Read the Problem
1. Identify the question.
2. Identify the facts.
3. Understand the vocabulary.
4. Visualize.
Explore
1. Analyzing the Data.
a. What's missing?
b. What's next?
2. Organizing and Representing Data
a. charts
b. tables
c. graphs
d. diagrams
3. Operational Concepts
4. Estimation
Select a Strategy
1. Look for Patterns
2. Draw a Picture
3. Simplify It
4. Guess and Test
5. Make an Organized List
6. Act it Out
7. Work Backwards
Solve
1. Computational Skills
2. Geometric Skills
3. Reasoning Skills
Check
1. Estimation
2. It is Reasonable?

The problem-solving process illustrated above gives students a way of attacking problems and helps them organize their thinking and efforts. Research shows that when students are provided with a wide variety of problem solving activities related to the world around them on a regular basis, their ability to solve problems is greatly enhanced. Every textbook has some kind of plan for teaching problem solving. Teachers must insure that sufficient time is provided for students to work with others insolving more complex and non-routine problems as well as those which are basic computation in a context.

Within each of the seven strands of North Carolina's fourth grade curriculum, problem solving is an important component. The separate problem solving strand focuses on teaching the process. On the next page there are a few examples of problems appropriate for fourth graders. Notice that many of them have more than one answer and can be solved in several different ways. It is important that students share their solutions with their classmates. The **Superstars** program, available through your central office, is a rich source of other problems.

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Sample Problems for Grade 4

- How long would one million dollars be, laid out end to end? How high would a stack of one million pennies be? (6,125,000 inches, 510,417 feet, 97 miles) (15,500, 000 cm, 155,000 m, 155 km)

- **I have a collection of 30 coins that consists of nickels and quarters. If the total face value of the coins is $4.10, how many of each kind of coin do I have? *(Ans. 17 nickels, 13 quarters)***

- What is the greatest number of 2-in. by 3-in. rectangular cards that can be cut from a rectangular sheet that measures 2 ft by 3 ft? *(Ans. 144)*

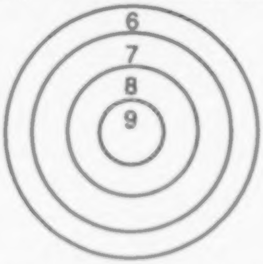
- **In a stationery store, pencils cost one amount and pens cost a different amount. The total cost of 2 pencils and 3 pens is 78¢. The total cost of 3 pencils and 2 pens is 72¢. What is the cost of 1 pencil? *(Ans. 12¢)***

- A chime clock strikes 1 chime at one o'clock, 2 chimes at two o'clock, 3 chimes at three o'clock, and so on. What is the total number of chimes that the clock will strike in a twelve-hour period? *(Ans. 78)*

- **Suppose that you have 100 pennies, 100 nickels, and 100 dimes. Using at least one coin of each type, select 21 coins that have a total value of exactly $1.00. How many coins of each type did you select? *(Ans. 5 pennies, 13 nickels, 3 dimes; or 10 pennies, 4 nickels, 7 dimes)***

- A man builds two kinds of furniture, stools (3 legs) and tables (4 legs). One day he used 37 legs to build furniture. How many tables and how many stools did he build that day? *(Ans. 11 stools, 1 table or 7 tables, 3 stools; etc.)*

- **Five darts were thrown at the target and it was hit each time. One number was hit twice and another was hit three times. The total score was 41. Which number were hit? *(Ans. 7 twice and 9 three times)* What scores other than 41 are possible?**

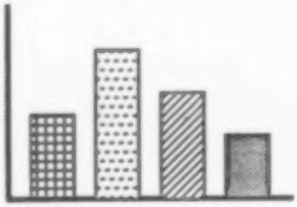


- If today is Tuesday, what day of the week will be 100 days from now? *(Ans. Thursday)*

- **You have won a prize - as many pennies as you can carry at one time! How much did you win? (Ans. will vary but should be logical and defended by students.)**

Sample Open-Ended Questions

- If you had a choice, would you rather have the number of nickels laid side by side to match the length of your foot or the number of quarters laid side by side equal to the width of your foot? Explain your choice.



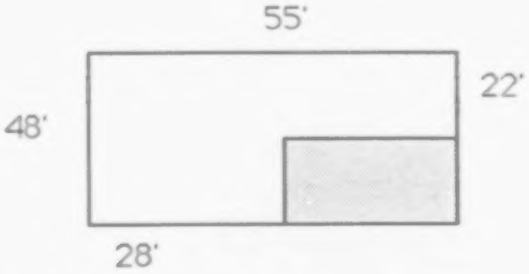
- **The labels on this graph have been lost. Give two different ideas that this graph could represent and tell how each would be labeled.**

- Explain step by step how to solve a long division problem such as 84 ÷ 4.

- **Draw a quadrilateral that is not a rectangle with a perimeter of 28. Draw another quadrilateral that is a different shape but has a perimeter of 28 units.**

- Use the digits 4, 5, 6, 7, and 8 to make a problem whose answer will be between 500 and 600.

- **How could you determine the area of the shaded part of this diagram? (You do not need to compute, but you must explain how you could get an answer.)**



- Draw a picture or a diagram to explain what two-thirds means.

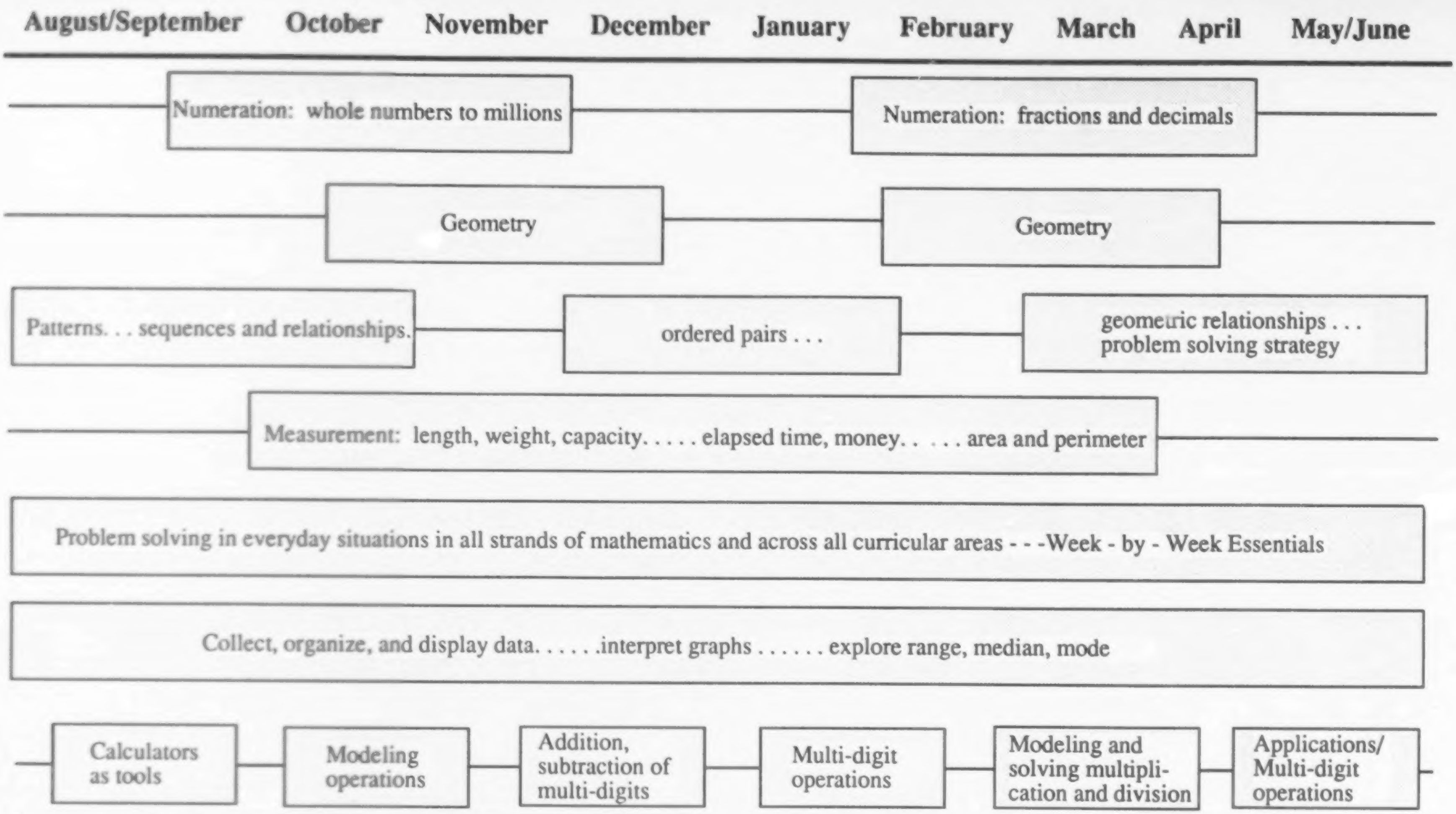
- **If the answer to the story problem is 15, what could the story have been?**

- Draw two different thermometers, one which uses a scale that counts by twos and the other that uses a scale that counts by ones. Show today's temperature on each thermometer.

- **Write two stories to show that 3 x 4 and 4 x 3 have the same product but when they are used in stories, they represent different things.**

- Survey your class and find out what everyone had to drink for lunch today. Make a pictograph to display the results of your survey.

- **North Carolina has 100 counties. How can you use this information to help other students understand decimal numbers?**



August/September October November December January February March April May/June

Numeration: whole numbers to millions — Numeration: fractions and decimals

Geometry — Geometry

Patterns. . . sequences and relationships. — ordered pairs . . . — geometric relationships . . . problem solving strategy

Measurement: length, weight, capacity. . . . . elapsed time, money. . . . . area and perimeter

Problem solving in everyday situations in all strands of mathematics and across all curricular areas - - -Week - by - Week Essentials

Collect, organize, and display data. . . . . .interpret graphs . . . . . . explore range, median, mode

Calculators as tools — Modeling operations — Addition, subtraction of multi-digits — Multi-digit operations — Modeling and solving multiplication and division — Applications/ Multi-digit operations

First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1.1 - 1.4 3.1 - 3.3 6.1 - 6.3 3.6 4.1 5.1 - 5.8 7.1 - 7.2	2.1 3.1 - 3.6 4.2 - 4.6 4.9 5.1 - 5.8 6.5 - 6.6 7.3 7.5 - 7.6	1.5 - 1.6 7.4 - 7.6 Division 7.8 2.1 - 2.6 3.7 4.7 - 4.8 5.1 - 5.8	2.1 - 2.6 1.7 - 1.9 4.10 - 4.11 5.1 - 5.8 6.4 6.7 7.7 7.9 - 7.10

As the chart above indicates, many topics are continued throughout the entire year. Each quarter's objectives need to be revisited.

GRADE FOUR PACING GUIDE

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GRAPHING

We live in an information age. Rapidly expanding bodies of knowledge combined with increased uses of technology clearly indicate that we as adults and the children currently enrolled in elementary grades will need to be able to evaluate and use vast amounts of data in personal and job-related decisions.

Skills in gathering, organizing, displaying, and interpreting data are important for students within all content areas. Graphing activities incorporate knowledge and skills from a variety of mathematical topics, integrating geometric ideas with computational skills and classification tasks with numeration understandings.

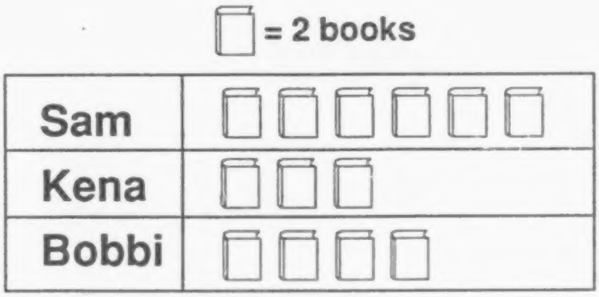
Graphs provide a means of communicating and classifying data; they allow for the comparison of data and display mathematical relationships that often cannot be easily recognized in numerical form. The traditional forms of graphs are picture graphs, bar graphs, line graphs, and circle graphs. New plotting techniques include line plots, stem-and-leaf plots, and box plots.

The following discussion is paraphrased and condensed from the National Council of Teachers of Mathematics publication *Developing Graph Comprehension*, pages 1-9.

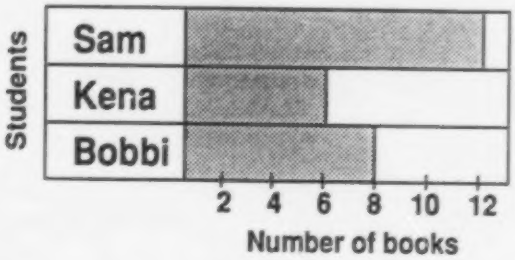
Traditional Graph Forms

Picture graphs. Picture graphs (pictographs) use the pictures to depict quantities of objects or people with respect to labeled axes. They are used when the data are discrete (i.e., noncontinuous). The symbols (ideographs) need to be the same size and shape. These symbols may represent real objects (e.g., a stick figure to represent a person or a carton to represent milk drunk by students) or they may take the form of something more abstract (e.g., a triangle or square).

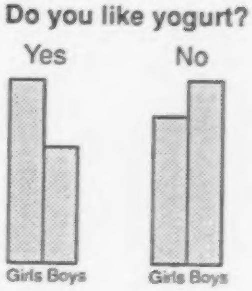
In picture graphs without a legend, the ideograph and the item it represents are in a one-to-one correspondence. When a legend is used, the ratio of each ideograph to the number of objects it represents must be taken into consideration when interpreting the graph. Fractional parts of ideographs (e.g., one-half of a picture) may cause some difficulties for children. Data presented in picture graphs are usually appropriate for bar graphs. Converting picture graphs to bar graphs is one way to help children move from semiconcrete representations of data to more abstract forms.



Bar graphs. Used horizontally or vertically, bar graphs (also called bar charts) compare discrete quantities expressed by rectangular bars of uniform width. The heights (or lengths) are proportional to the quantities they represent. The bars are constructed within perpendicular axes that intersect at a common reference point, usually zero. The axes are labeled.



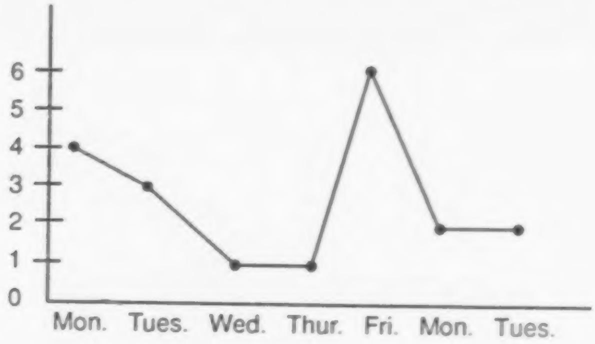
Multiple or double bar graphs are used to compare discrete stratified data (i.e., data collected from particular groups). For example, when asking children to vote for their favorite pets, colors, or favorite games to play, organize the results according to boys' responses and girls' responses.


Do you like yogurt?

Line graphs. A line graph (broken-line graph) is used to compare continuous data. Points are plotted within perpendicular axes to represent change over a period of time or any linear functional relationship. The labeled axes intersect at a common point, usually zero. The units of division on each axis are equally spaced, and the graphed points are connected by straight or broken lines. When children keep a record over a period of time of their own height or weight, of the daily average temperature, and so on, line graphs are appropriate displays.

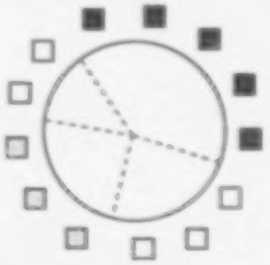
Multiple line graphs are used to compare two or more sets of continuous data - for example, to compare the heights or weights of two children over a period of time (e.g., four months or one year), or the heights of two (or more) plants over a period of time (e.g., one to two months after planting seeds).

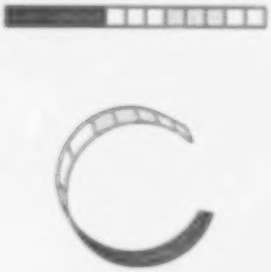
Absences from Sept. 7 to Sept. 15



Circle graphs. The area of the circle graph (pie graph, pie chart, area graph) is divided into sections by lines emanating from the center of the circle. Circle graphs are appropriate when children have an understanding of fractions; they provide children with a means of displaying the relationship of parts to whole.

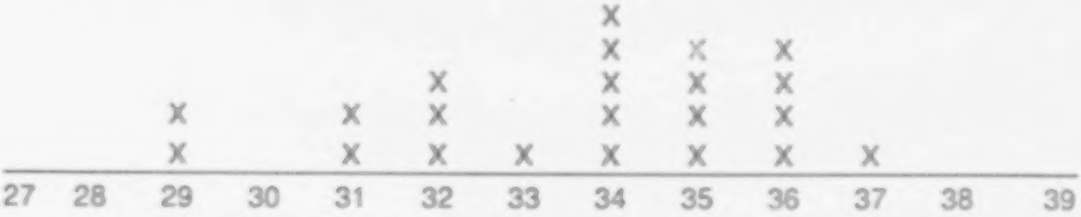
Children may informally create circle graphs before they are able to measure angles and figure proportions. For example, counters representing the total units are evenly spaced around the circle. When the divisions occur, a radius is drawn to divide the circle into appropriate parts. A second informal method is to mark units on a strip and then loop to form a circle, drawing radii as appropriate.





Some New Techniques

Line plots. Line plots look like primitive bar graphs, where numerical data are plotted as *x*'s placed above numbers on a number line. A line plot "gives a graphical picture of the relative sizes of numbers, and it helps you to make sure that you aren't missing important information" (*Developing Graph Comprehension*, Landwehr and Watkins 1986, p. 5). Unlike a bar graph, in which data may be lost in the grouping, none of the date gets lost in a line plot.

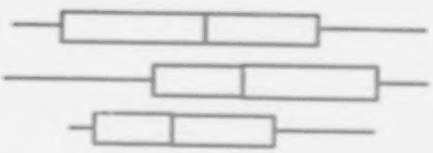


Line Plot

Stem-and-leaf plots. These plots are characterized by a "separation" of the digits in numerical data. For example, in a simple stem-and-leaf plot the tens digits are listed in one column and the ones digit are listed in a row next to the respective tens digit. When rotated ninety degrees counterclockwise, the stem-and-leaf plot resembles a bar graph. The development of the stem-and-leaf plot and the box plot have been attributed to John Tukey (1977).

```
1 |
2 | 7 7 8 8 8 9
3 | 1 1 2 2 2 2 3 4
4 | 1 1 3 4 5 5 6
5 | 0 1 2 2
6 |
```

Stem and Leaf



Box and Whiskers

Box plots. Box plots (box-and-whisker plots) use five summary numbers (i.e., the lower extreme, the lower quartile, the median, the upper quartile, and the upper extreme) and are helpful when analyzing large quantities of data (i.e., more than 100 pieces of data). Although this type of display may be more difficult to construct, it has been used effectively with middle school students.

Levels of Graph Comprehension

While it is important for students to be able to read data presented in graphical forms, a greater potential is realized when they are able to interpret and generalize from the data. Regardless of the graph form used, the three levels of graph comprehension are reading the data, reading between the data, and reading beyond the data.

Reading the Data. This level of comprehension requires a literal reading of the graph. The reader simply "lifts" the facts explicitly stated in the graph, or the information found in the graph title and axis labels, directly from the graph. There is no interpretation at this level. Reading that requires this type of comprehension is a very low level cognitive task.

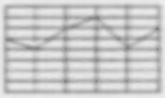
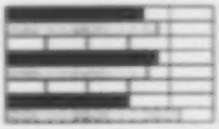
Reading between the Data. This level of comprehension includes the interpretation and integration of the data in the graph. It requires the ability to compare quantities (e.g., greater than, tallest, smallest) and the use of other mathematical concepts and skills (e.g., addition, subtraction, multiplication, division) that allow the reader to combine and integrate data and identify the mathematical relationships expressed in the graph. This is the level of comprehension most often assessed on standardized tests.

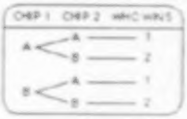
Reading beyond the Data. This level of comprehension requires the reader to predict or infer from the data by tapping existing schemata (i.e., background knowledge, knowledge in memory) for information that is neither explicitly nor implicitly stated in the graph. Whereas reading between the data might require that the reader make an inference based on the data presented in the graph, reading beyond the data requires that the inference be made on the basis of a "data base" in the reader's head, not in the graph.

As students experience the physical creation of a graph, they should be involved in interpreting it. Questions that reflect reading the data, reading between the data, and reading beyond the data provide a basis for interpreting and discussing graphs.

Discussions about graphs should revolve around listening, speaking, reading, and writing. Activities that provide children with the opportunity to interpret graphs and plots should include teacher-made and student-formulated questions reflecting different levels of comprehension. Children should be encouraged to write about graphs to clarify their thinking and communicate their interpretations with others. Working in groups of four or five students, they should talk about the graphs they create.

Glossary of Terms for Goal 6

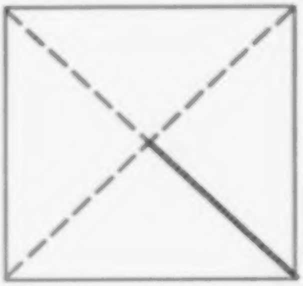
Array	An orderly arrangement of symbols or objects in rows and columns.
Average	The mean. The sum of all the items in a set of data divided by the number of items.
Bar Graph	A graph in which the height or length of each bar is proportional the data it represents.
Broken Line Graph	A graph of lines connecting points on a grid of horizontal and vertical lines showing a change over a period of time. 
Circle Graph	A circle used to show how a whole quantity is divided into parts.
Data	Facts about objects or events. Synonymous with information.
Diagram	A drawing or sketch that shows how parts are related to each other and to the total.
Double Bar Graph	A bar graph in which parallel bars compare the differences between data (e.g. girls preferences vs. boys preferences) 
Frequency Table	A table that organizes numerical data into intervals that can be tallied to show frequency and relative frequency.
Generate	To gather information.
Graph	A drawing designed to show relationships between two (or more) sets of values.
Graph Key	Information that makes a graph understandable.
Histogram	A bar graph that shows the frequencies of intervals of data.
Horizontal Axis	A line used for reference going left to right. Also known as the "X-axis."
Hypothesis	An assumption based on established fact.
Interpret	To explain the meaning of…beyond first-glance reading of obvious results.
Intersection	A point, line, or place where one item crosses another.
Legend	The explanation of the symbols or numerals used on a graph.
Line Graph	Line plotted through points of a graph. A line graph shows a trend.
Matrix	A rectangular array of numbers.
Mean	The sum of the numbers divided by the number of addends (average).
Median	The middle number when a set of numbers are arranged in order.
Mode	The number occurring most often in a set of data.

One-to-One Correspondence	A pairing which matches one member of a set with one and only one member of another set.
Pattern	Regular arrangement in a sequence or order which allows for prediction.
Pictograph	A diagram, chart, or graph presenting statistical data by using pictures, symbols, or different colors, sizes, or numbers.
Polyhedral Dice	Dice having more sides than standard dice.
Population	In statistics, the entire group of items or individuals from which the samples under consideration are presumed to come.
Possible Outcomes	All results that may exist.
Probability	Something likely to happen—the likelihood that an event will occur estimated as ratio as, in "1 of 2" or "1 out of 2."
Proportion	The relation in size, number, or amount, of one thing compared to another.
Random	By chance—without a definite aim, plan, method, or purpose.
Range	The difference between the largest and smallest number in a set of data.
Ratio	A comparison of two members by division—3/2, 3:2, 3 ÷ 2.
Raw Data	Collection of facts that have not been processed into usable information.
Sample	Data gathered from a part of a population which is representative of the response of the entire population.
Statistics	The science of collecting, classifying, and analyzing facts.
Stem and Leaf	An orderly arrangement of data based on place value;the tens are the stem and the ones are the leaves
Symbol	A letter, figure, or sign that stands for or represents an idea, quality or object.
Table	Information in a brief, organized form, usually in columns.
Tally	A mark made to record a certain number of objects—used for keeping count.
Tree Diagram	A diagram used to find the total number of possible outcomes in a probability experiment.  CHIP 1 CHIP 2 WHO WINS A A 1 B 2 B A 1 B 2
Trend	The direction, course, or tendency shown by the data.
Venn Diagram	Circles which organize data to give a pictorial representation of the relationship of sets.
Vertical Axis	A line used for reference going from top to bottom—also known as the *Y*-axis.
Zero Probability	An event which cannot happen.

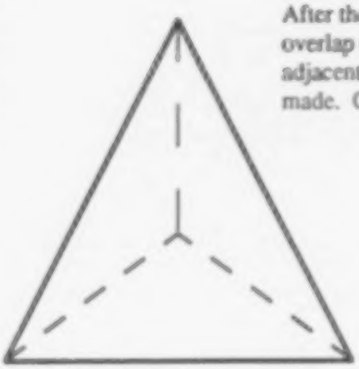
Displaying Our Ideas

Triaramas and quadraramas are display ideas that are three-dimensional. They begin with a square (four squares for a quadraramas) allowing students to draw and write on a flat surface, then fold into a stand-up display.* Cooperative learning comes alive when each student builds one of the four parts of a quadrarama. Text and background scenes go on the sides and bottom; stand-up figures can complete the foreground.

To make a triarama, follow these steps.



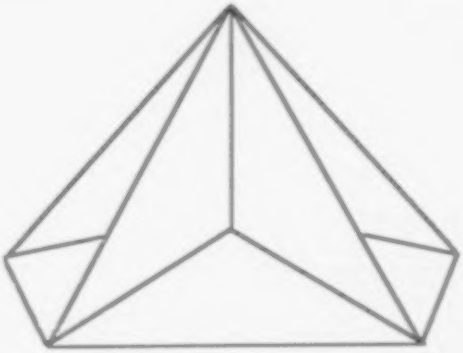
Use a large square such as 9" x 9" or 12" x 12" construction paper. Fold diagonals and cut on solid line.



After the scene is drawn, overlap the triangles adjacent to the cut you made. Glue or tape base.

To make a quadrarama, make four triaramas and attach them back to back;

- North Carolina historical sites
- Seasons in North Carolina
- North Carolina's native Americans
- Multiples of six (a different display on each side)
- Mathematics in nature
- Steps in constructing polyhedra
- Mathematics in careers

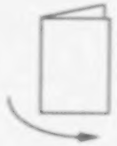


Ideas from Alternatives to Worksheets by Karen Bauer and Rosa Drew, Creative Teaching Press.

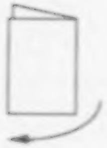
POP-UP PROJECT #1

This activity relates math, art and creative writing. It will give you a chance to read and follow directions. You will also have an opportunity to do some spatial problem solving and creating!

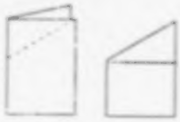
Directions:



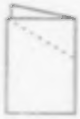
1. Fold paper side-to-side.



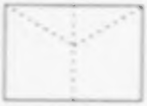
2. Reverse this fold.



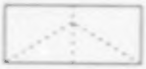
3. Take a corner on the fold and turn it down to create a right triangle.



4. Reverse this fold.



5. Open paper all the way.



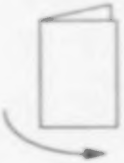
6. Fold top to botton.

7. Now close paper partly, (be sure you're looking at the triangle) lift triangle into center finish closing and "press" outside.

VOILA! you have a basic pop-up. Now you can be creative and add details. Write a story and use your pop-up as part of an illustration.

POP-UP PROJECT #2

1



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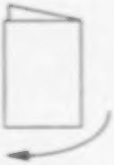

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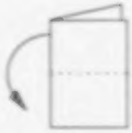

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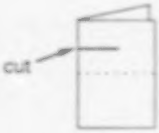
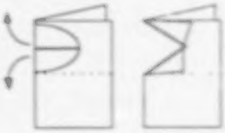


5, 6



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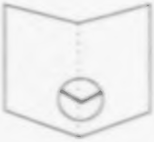
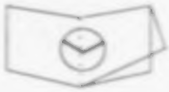


8



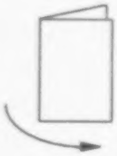
Directions

1. Fold paper side-to-side.
2. Reverse this fold.
3. Fold top-to-bottom and unfold.
4. Cut on the fold side about 1/4 down from top and stop before reaching other side.
5. Fold corners on the cut to create right triangles. One folds up, other folds down.
6. Reverse these folds.
7. Open paper all the way.
8. Fold top to bottom.
9. Now close slightly (be sure you're looking at the triangles), lift triangles, finish closing and press.

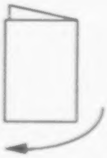
Now you're ready to add the creative details—try some of the variations included. (Be sure to crease hard and reverse folds.)

POP-UP PROJECT # 3

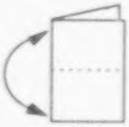
Directions:



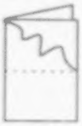
1. Fold side-to-side.



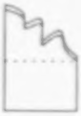
2. Reverse fold.



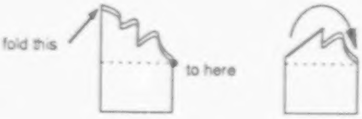
3. Fold top to bottom and unfold.



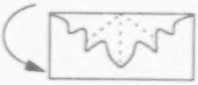
4. Draw squiggle from to corner on fold to outside edges at middle fold.



5. Cut on squiggle.



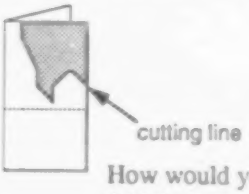
6. Fold beginning point of squiggle down to ending point.
7. Reverse fold.



8. Open up all the way, fold top to bottom.
9. Make pop-up work (be sure to close part way and lift).

For Extensions:

- try adding folds
- try cutting on other folds and folding again.
- try creating something specific—like an elephant, etc.



How would you fold the trunk to make it pop-up?

Estimation for the Entire Fourth Grade!

Estimates are educated guesses; they are answers based upon experiences or information. By fourth grade students are asked to determine when an estimate or approximation would be appropriate and when an exact answer is needed. They learn to formally round numbers and to use a variety of estimation strategies.

Many of the following ideas have approximations for answers, while other ideas lead to experiments, surveys, or counting lessons. For some estimates you will need to specify units of measurement. You may want to cluster estimation experiences to focus on a topic for several days. The sequence in which estimation activities are used is, for the most part, not important. Check off the activities as you use them.

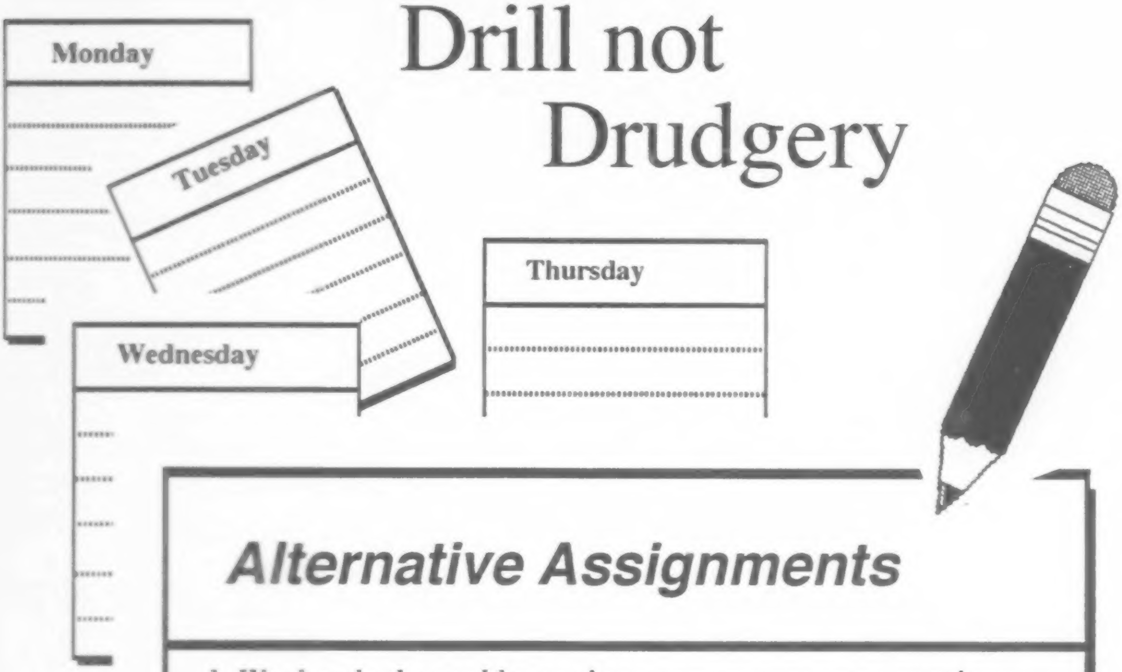
Estimate...

1. Total number of letters in our first names
2. Total number of letters in our last names
3. Students in the 4th grade born in this county
4. Height of your pumpkin
5. Length of string to go around watermelon
6. Typical cost of a watermelon
7. Weight of your watermelon
8. Number of seeds in your watermelon
9. Number of counters in a glass
10. Number of counters in a jar
11. Number of commercials in 2 hours of tv
12. Total miles class travels to school
13. Number of wheels in school parking lot
14. Average number of apples in a bushel
15. Weight of an apple; compare to pumpkin
16. Height of an apple; compare to pumpkin
17. Circumference of an apple; compare to pumpkin
18. Number of seeds in your apple
19. Distance across the classroom in feet/meters
20. Distance from classroom to water fountain
21. Distance from classroom to cafeteria
22. Distance from classroom to front door
23. Distance from your desk to door
24. Distance from teacher's desk to door
25. Distance from pencil sharpener to door
26. Number of students in your school system
27. Population of your county
28. Population of North Carolina
29. Month with most students' birthdays
30. Number of days until January 1
31. Counties with population less than 10,000
32. Number of days left in school
33. Number of graham crackers in a box
34. Height of tallest teacher
35. Height of shortest teacher
36. Perimeter of teacher's desk
37. Length of student's pencil
38. Sum of people in students' families
39. Present temperature in the classroom
40. Number of 0's on a hundred board
41. Number of 4's on a hundred board
42. Favorite snack of students in class
43. Number of pockets in the classroom
44. Favorite entree of students in class (grade)
45. Cartons of milk sold in cafeteria in a day
46. Length of string to surround math book
47. String to reach across student's desk
48. String to match length of eraser
49. String as tall as student
50. String as long as student's foot
51. Kernels in a scoop of unpopped corn
52. Volume of popcorn if 1/2 cup is popped
53. Cups of popcorn if a lb. bag is popped
54. Cost of a one pound bag of popcorn
55. Playing cards to cover student's desk
56. Playing cards to cover classroom floor
57. Total number of dots on a regular die
58. Preferred sport of students
59. Magic markers teacher can hold in hand
60. Sum of heights of students
61. Number of oranges the basket will hold
62. Number of buttons on students' clothing
63. Number of door knobs in the school
64. Doors at home (include cabinets)
65. Length of school hallway
66. Perimeter of school building
67. Perimeter of school property
68. Number of only children in class
69. Number of adults working in the school
70. Years of experience in education of adults in school (of students in the school)
71. Favorite TV commercial of students in class
72. Favorite TV show of students
73. Hours of TV watched per week by students
74. Number of letters of the alphabet that do not begin name of a county in N.C.
75. Height of the teacher in cm
76. Height of classroom door in cm
77. Width of classroom door in cm
78. Number of students wearing shoes that tie
79. Difference in high/low daily temperatures
80. Most popular letter in headlines
81. Number of miles across N.C.
82. Articles on page 1 of newspaper
83. Number of students who are left-handed
84. Length of longest pencil in class

85. Number of students in the school system
86. Crayons to weigh 1 pound
87. Number of calories in a slice of pizza
88. Number of calories in a chocolate candy bar
89. Minutes to walk around the school 3 times
90. Minutes to walk a kilometer
91. Minutes to walk a mile
92. Minutes in school day
93. Vehicles passing school in 10 minutes
94. Length of a line of 10 new pencils
95. Length of a line of 10 social studies books
96. People who brought lunches today
97. Students in school who wear glasses
98. Average cost of a gallon of milk
99. Slices of bread in a sandwich loaf
100. Length of string to circle student's wrist
101. String to circle student's waist
102. String to go around edge of waste basket
103. Length of average student's foot
104. Length of classroom bulletin board
105. Number of pages in the telephone book
106. Number of door knobs in the school
107. Number of windows in the school
108. Students wearing white socks today
109. Number of trucks in the school parking lot
110. Most popular color vehicle in parking lot
111. Page in phone book with your number
112. Names in a column in the phone book
113. Number of computers in the school
114. Number of smoke detectors in school
115. Number of file cabinets in school
116. Number of cups of drink in a pitcher
117. Number of cups of water to fill the sink
118. Total brothers and sisters of students
119. Number of steps in the school
120. Pattern blocks to cover notebook page
121. Number of cm cubes to cover notebook page
122. Articles about math in Sunday's paper
123. Number of legs in classroom
124. Number of books about N.C. in classroom
125. Number of books about N.C. in library
126. Number of books in classroom
127. Books in the school library
128. Books related to math in the library
129. Number of Friday the 13ths this year
130. Most popular letter which begins students' names
131. Most popular number of letters in students' first names
132. Cubes to measure length of chalk tray
133. Number of M & M's in a scoop
134. Number of M & M's in a 1 pound bag
135. Weight of math book
136. Weight of student of average size in class
137. Weight of social studies book
138. Weight of an average-size banana
139. Number of pennies to balance a kilogram
140. Hours most students sleep each night
141. Distance across the globe (diameter)
142. Distance around the globe (circumference)
143. Length of average newspaper headline
144. Columns on front of newspaper page
145. Length of the N.C. flag at school
146. School buses operated in the system
147. Width of a cafeteria table
148. Length of stapler
149. Thickness of the class dictionary
150. Number of absences in the school today
151. Students who could fit into a classroom with all furniture removed
152. Books checked out last Wednesday
153. Time for ice cubes to melt in classroom
154. Time for ice cubes to melt in hot sun
155. Length of time to count to 1,000 on a calculator by 5's (+5=)
156. Favorite color of students in the class
157. Height of the large orange school buses
158. Jumping jacks student can do in 1 minute
159. Hours of math this year
160. Number of hot dogs and hamburgers served by cafeteria this year
161. Fourth graders who ride buses to school
162. Drops of water that can be placed on a dime without spilling
163. Number of students with perfect attendance
164. Square inch blocks to cover math book
165. Square inch blocks to cover a newspaper page
166. Number of cubes to fill a show box
167. Most frequently used word on page of text
168. Number of pennies to fill a "swish" cup
169. Number of pennies to weigh one pound
171. Rectangle the size of a candy bar
172. Circles the size of quarter and the bottom of a soda can
173. Number and kind of shapes on a soccer ball
174. Favorite cereal of class
175. Favorite beverage of class
176. Lettuce used in cafeteria in one day
177. Approximate-number strawberries in 1 lb.
178. Total amount of change in student's pockets
179. Number of Saturdays in 1994
180. Number of days until school resumes

Are you interested in professional books? Ask the librarian to order ***Everybody Counts*** from NATIONAL ACADEMY Press, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 for about $8.00. Also ask for a list of publications from the National Council of Teachers of Mathematics (703 - 620 - 9840).

Drill not Drudgery



Alternative Assignments

1. Work only the problems whose answers are even numbers.

2. Work the five problems which will have the largest answers. (or smallest answers)

3. Work only two problems - the largest and smallest answers.

4. Work only the problems whose answers are multiples of five.

5. Solve only the problems with an answer greater than 100.

6. Do not solve the problems. For each one tell if you would need to regroup if you were to solve it.

7. I worked the problems for you, but I made some mistakes. Please correct them.

8. Work only the problems whose answer is a multiple of 10.

9. Do not solve the problems. For each one tell if the answer is odd or even.

10. Here are 5 answers. Match them to the problems.

Papy's Computer

800	400	80	40	8	4
200	100	20	10	2	1

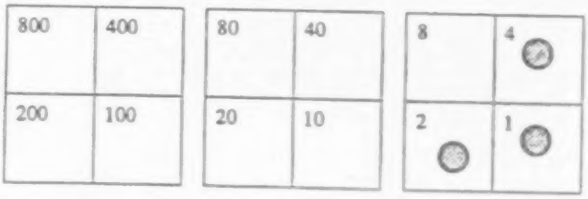
Papy's Computer

Practice modeling numbers in a variety of ways helps children develop number sense. Awareness of number relationships also strengthens estimation and computational skills.

In the early 1970's the students in Frederica Papy's fourth grade class in Belgium invented a type of two-dimensional abacus that has become known as Papy's Computer. Introduced into the United States through a National Council of Teachers of Mathematics annual meeting, Papy's Computer was orginally created as an extension of work with Cuisenaire Rods. John Firkins of Gongaza University shared Papy's Computer with teachers in North Carolina.

Use counters and Papy's computer (see blackline master) to build one, two, and three digit numbers. Here are several examples:

7 =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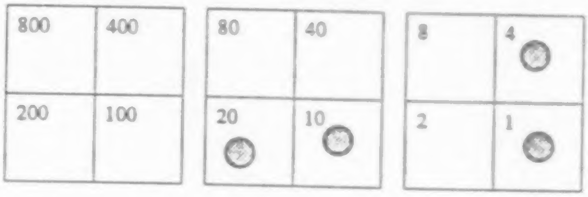
35 =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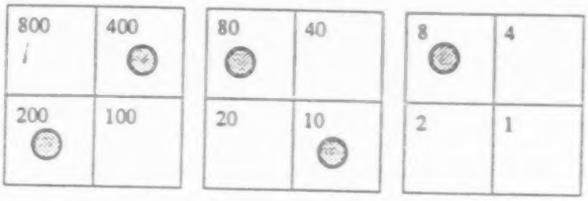
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Notice that no square has more than one counter.

Correct Models

Incorrect Models

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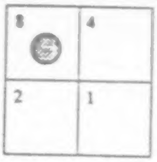

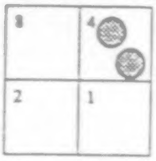

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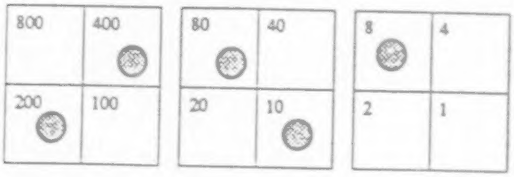
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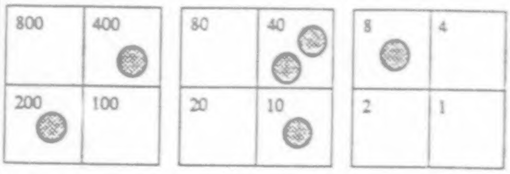
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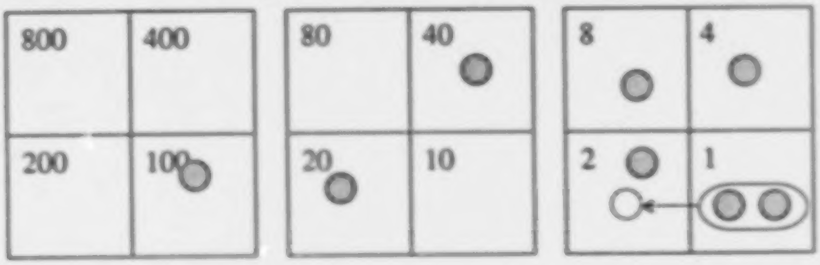
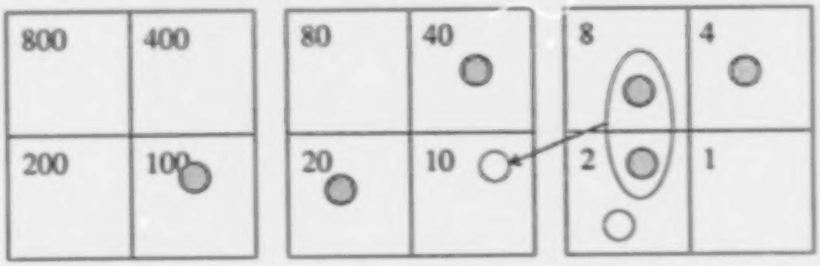
Give children opportunities to build numbers on the overhead so that all can see correct models and then allow them to work with a partner to practice building many numbers. Try modeling these numbers: 43, 59, 137, 524, 691. You may wish to have students work with partners at their desks and take turns showing their models on the overhead.

Adding with Papy's Computer

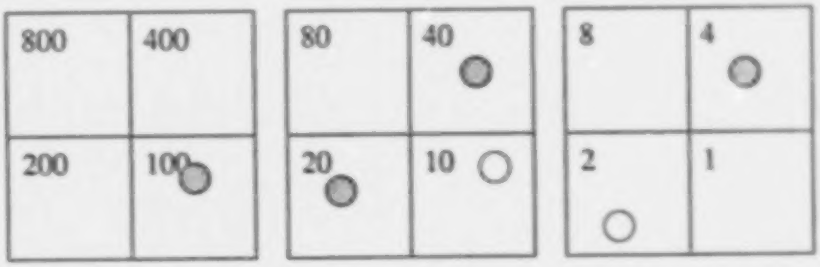
Addition of sums to 999 can be done on the boards. For example: If you are adding 129 to 47, you would first build 129 and then build 47 on the same boards. (You would put counters on the 100, 20, 8, and 1 for 129 and then on the 40, 4, 2, and 1 for 47.) To do the addition, you must rearrange the counters on the boards so that each board has no more than one counter in each square. The two counters on the 1 are added together and exchanged for one counter on the 2.



Now there are two counters on the 2. One counter on the 2 should be added to the counter on the 8 and exchanged for one marker on the 10 rather than changing two 2's for one counter on the 4. This is to avoid having two counters in the same space. At this point there is only one marker on any square.



By adding the numbers on which there is a counter you have the answer to the addition problem.

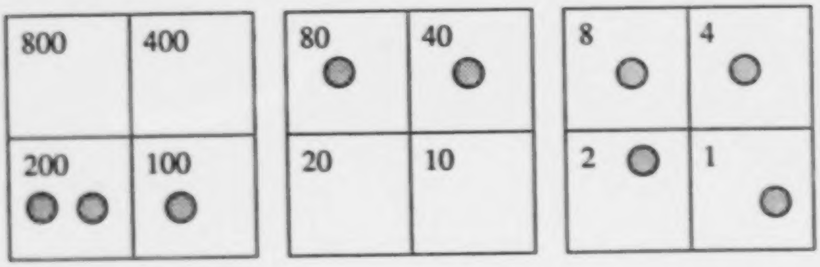


100 + 40 + 20 + 10 + 4 + 2 = 176

Try these examples: 56 + 29, 234 + 217, 603 + 28 (You may wish to try them yourself before workng with the students.)

A more difficult problem involves several steps in trading:
287 + 348

a. Build both numbers.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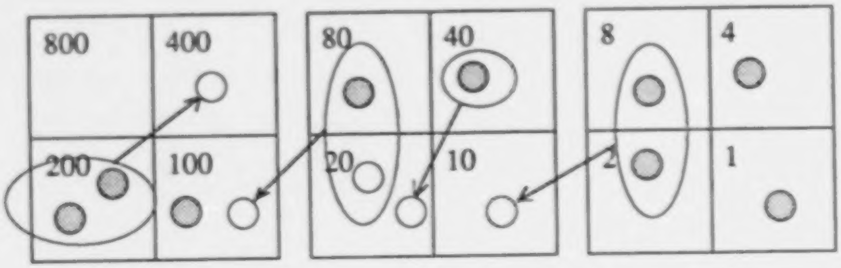
b. Combine 2 and 8 to make a 10.
c. Trade a 40 for two 20's and add 20 + 80 to make 100.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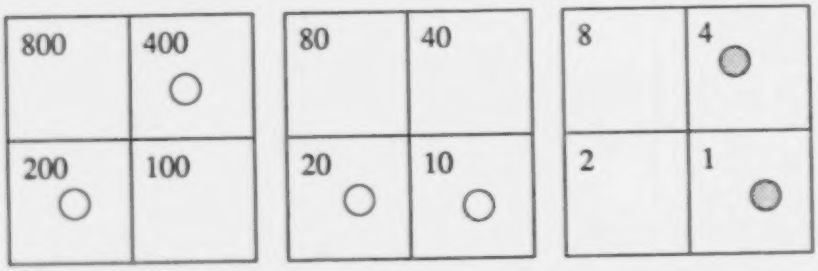
d. Combine two 200's to make a 400.
e. Combine two 100's to make a 200.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1

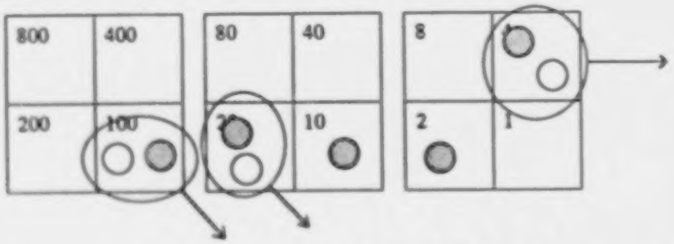
400 + 200 + 20 + 10 + 4 + 1 = 635

Papy' Computer appeals to many students while others find it difficult to go beyond modeling of numbers and simple addition. Encourage children to work with partners to both assist and monitor each other.

The boards may be used for subtraction.

Here is one simple subtraction example. Two different colored counters are helpful. Use ● counters to show 136 and ○ counters to model 124. Notice this is building a type of comparative model.

136 – 124 = 12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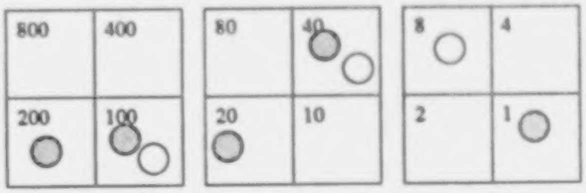
If there are equal counters of two colors in a square, they cancel each other out and are removed from the board. The answer to the subtraction will be on the board when the counters are all the color of the difference.

Below is a more complex model because of the need to trade one counter of higher value for others to make an equal value. Use ● to show 361 and ○ to show 148.

361 – 148 = 213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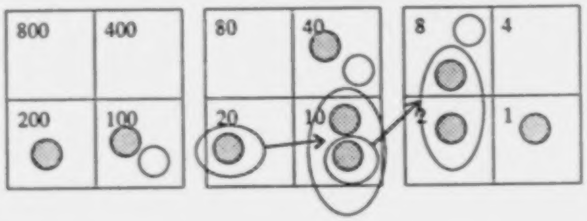
Because you need to remove both 148 in the lighter counters and 148 from the original set, you must trade to be able to remove the counter from the 8. Trade one 20 for two 10's. Then trade one 8 and a 2.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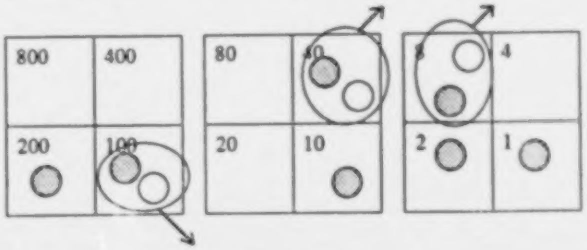
Now you can remove the pairs of opposite colors: the two 8's, the two 40's and the two 100's.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200 + 10 + 3 = 213

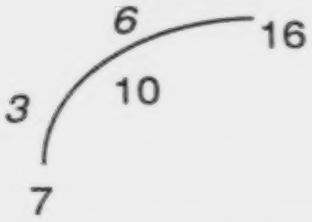
More Alternatives for Operations

Subtraction of Facts

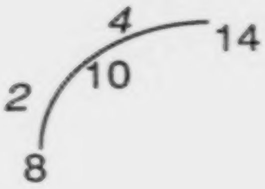
Subtraction facts remain a source of trouble for some fourth graders. Lola May offers some assistance:

"For facts when the sum is greater than 10 teachers often say, 'make a ten and then add on'. The words are often meaningless to pupils but the concept is fine. The Hill model is used to build a model in the mind of the pupils".

$$\begin{array}{r} 16 \\ -7 \\ \hline 9 \end{array}$$



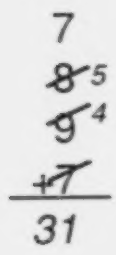
$$\begin{array}{r} 14 \\ -8 \\ \hline 6 \end{array}$$



Draw a hill in which the top is 16; the bottom of the hill is 7. In between write 10.From 7 to 10 is 3 and from 10 to 16 is 6. Add: 3 + 6 = 9 In the next example, 14 is the top of the hill and 8 is at the bottom. Write 10 in between. Since 8 to 10 is 2 and 10 to 14 is 6, add 2 + 6.

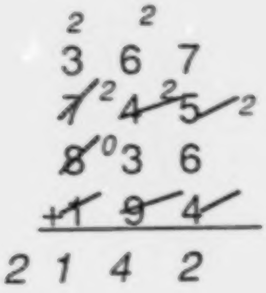
Addition of Large Numbers

The addition of large numbers or columns of numbers may be accomplished through the "low stress algorithm" or the "check" method. Dr. May points out that two big trouble spots-the inability to add unseen digits to seen ones and carrying the wrong number-are eliminated by this process. In this method students make checks to indicate tens and record the ones digits as they go.



7 + 8 = 15
Check 8, write 5
5 + 9 = 14
Check 9, write 4
4 + 7 = 11
Check 7, write 1
in the ones place
3 checks, write 3
in tens place

$$\begin{array}{r} 367 \\ 745 \\ 836 \\ +194 \\ \hline 2142 \end{array}$$



continued

Multi-digit Subtraction

Subtraction is accomplished in other countries through a method known as compensation. In this process students add tens, hundreds, etc. as needed to subtract, but at the same time compensate the subtrahend accordingly. Work through these examples to see how the process works.

$$\begin{array}{r} 5\ \overset{1}{4}\ \overset{1}{2}\ 8 \\ -3_{1}7\ {}_{1}6\ 4 \\ \hline 1\ 6\ 6\ 4 \end{array} \qquad\qquad \begin{array}{r} 6\ \overset{1}{4}\ 3\ \overset{1}{5} \\ -1_{1}8\ 2\ {}_{1}9 \\ \hline 4\ 6\ 0\ 6 \end{array}$$

Multiplication of Multi-digit Numbers

Lattice multiplication is an alternative to the traditional multiplication algorithm. It is explained in the competency goals and objectives section on page B75. Students who have difficulty with multiplication of larger numbers may find this method much easier since it builds on facts.

Checking multiplication and division

To check complex multiplication problems students might work with partial products or become involved in a complex division problem. The potential for errors abounds! An alternative way is to check by "*casting out nines*." Steps in checking a multiplication problem are these:

First: Toss out all nines and combinations of nine in each factor.
Second: Add remaining digits until the sum is one digit.
Third: Multiply the two single digits and repeat steps 1 and 2 until a single digit results.
Fourth: Apply steps 1 and 2 to the product. If the resulting single digit matches the result in step 3,the product should be correct.

$$\begin{array}{r} 5246 \\ \times\ 50 \\ \hline 0\ 000 \\ +26\ 230 \\ \hline 262{,}300 \end{array}$$

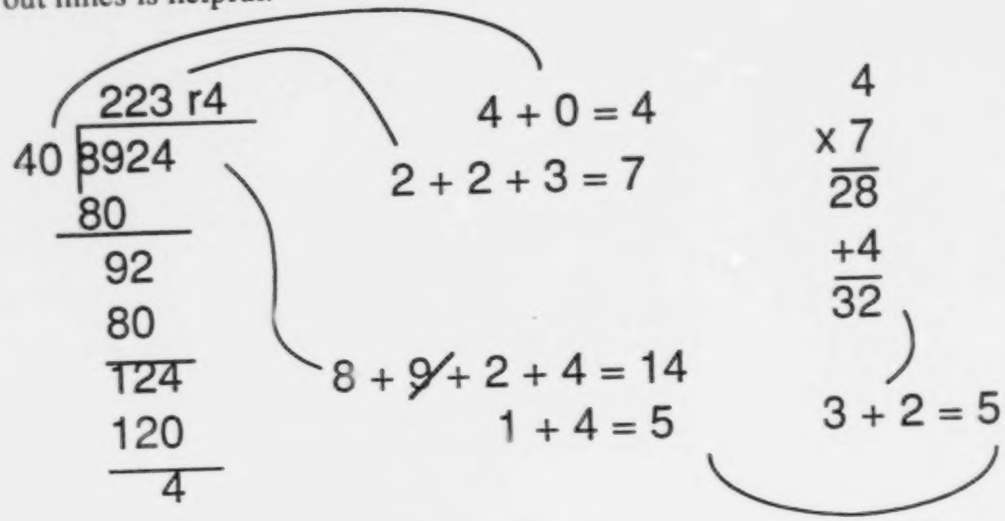
$$\cancel{5} + 2 + \cancel{4} + 6 = 8 \qquad 8 \times 5 = 40$$

$$5 + 0 = 5 \qquad 4 + 0 = 4$$

$$2 + \cancel{6} + 2 + \cancel{3} + 0 + 0 = 4$$

continued

Students are frequently taught to check division by using the opposite operation. For example, to check 8924 ÷ 40, students are told to multiply the quotient by the divisor and add in the remainder. (233 x 40) + 4. Again, casting out nines is helpful.



COOPERATIVE LEARNING

Many of the activities in this book promote cooperative learning. When students are encouraged to interact in small cooperative groups, each student has more opportunity to actively participate in learning.

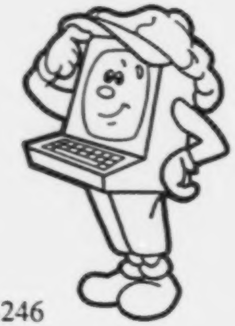
There are many advantages to cooperative learning:
- It encourages risk taking (it's easier to make a mistake in a small group).
- It discourages non-participation.
- It encourages working together for common goals.
- It teaches students to value the input of their peers.
- It gives children support in solving problems.
- It models real-life group decision making.
- It encourages language development.
- It encourages children to clarify their thinking.
- It emphasizes role of teacher as facilitator.

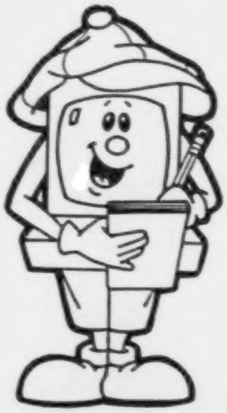
MECC Software Alert

The Division of Media and Technology, Computer Services section, has correlated MECC software with North Carolina's Teacher Handbook objectives. A specific correlation is available through each LEA's computer coordinator.

Fourth grade teachers may find the following programs helpful in their mathematics and social studies classes:

1. MECC Dataquest: The Fifty States MECC A-163
2. USA GeoGraph MECC UGS-103 (Teacher Utility)
   MECC Dataquest: The Fifty States MECC A-163
3. Instant Survey Sampler, MECC A-224
4. MECC Graph MECC A-137
   MECC Graphing Primer MECC A-136
5. Number Munchers MECC A-170
6. Fraction Concepts, Inc. MECC A-202
7. EZ LOGO MECC A-775
8. Picture Chompers MECC A-255
9. Patterns MECC A-227
   Addition Logician MECC A-125
10. Measure Works (How Many Units) MECC A-246
11. Clock Works MECC A-168
12. Calendar Crafter MECC A-194
13. Money Works MECC A-195
14. Measure Works (Fence the Animals) MECC A-246
15. Addition Logician MECC A-125
    Path Tactics MECC A-162
16. Jenny's Journeys MECC A-161
    Coordinate Math MECC A-192
17. Conquering Whole Numbers MECC A-201
18. Conquering Decimals (+, -) MECC A-207
19. Multiplication Puzzles MECC A-147
    Quotient Quest MECC-A-148
20. Speedway Math MECC A-169
21. Estimation: Quick Solve 1 MECC A-202
22. Fraction Practice Unlimited MECC A-203
23. Decimal Concepts MECC A-206
24. Elementary Volume 8 MECC A-732
25. Early Addition (Create a Creature) MECC A-788
26. Estimation: Quick Solve II MECC A-259





Mystery Box

Your mystery box can be any box you choose. Boxes that hold duplicating paper are a good size. Cover the box with construction paper and decorate with lots of question marks.

The mystery box is used to play the game *20 Questions* so the students can ask questions to discover the contents of the box. You can place items for estimation, graphing, sorting or anything else in the box.

Rules for Twenty Questions

Questions must be answered *yes* or *no*.

Questions can be asked about the attributes but not the actual item.

Allowed	Is it round? Can you eat it? Are there more than three?	Not Allowed	Is it a cookie? Is it a doughnut? Is it a watermelon?

Students must listen carefully because the teacher will only answer a questions one time. If the same question is asked a second time, the teacher will reply: "That question has already been asked and answered."

Teacher or student keeps a tally of the 20 questions.

Students are not allowed to guess or state the contents until all 20 questions have been asked.

Encourage them to ask a question that will give them more information and/or make them absolutely sure.

For example, if you have M & M's in the box, they could ask, "Does it have a letter of the alphabet on it?" "Does it melt in your mouth, not in your hands?"

Integrating geometry and fractions

Create Your Own Tangrams

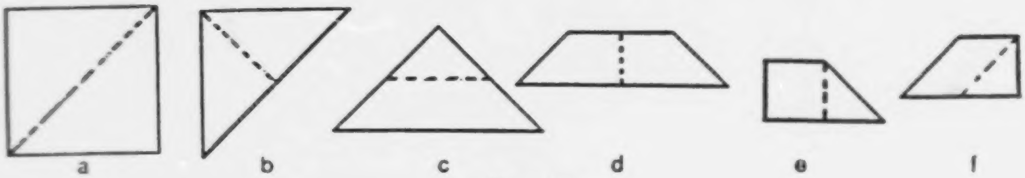
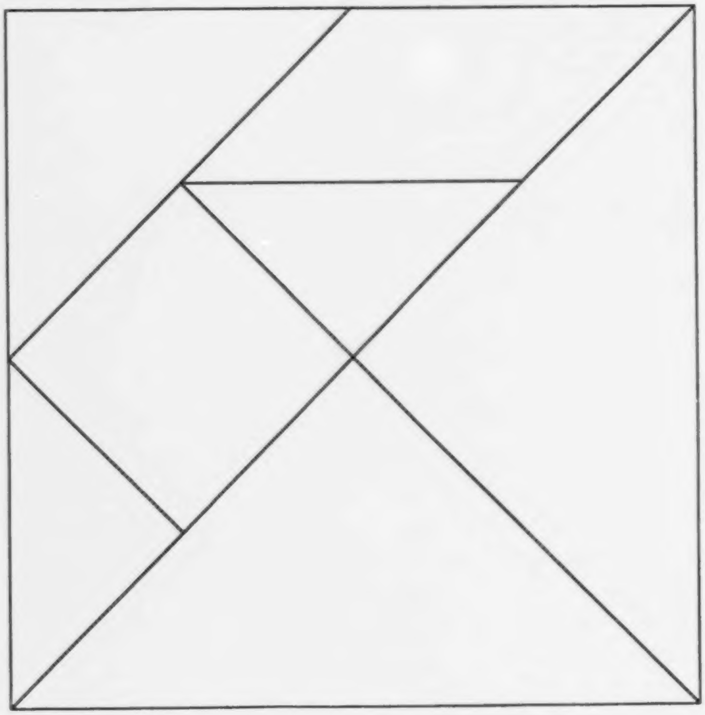


Figure 2

a. Fold square into 2 large congruent triangles. Cut apart on the fold.
b. Fold both large triangles into two right triangles. Cut one of them on the fold and set these two pieces aside.
c. Fold the second large triangle so that the right angle corner touches the midpoint of the base. Unfold and cut the triangle from the trapezoid. Set the triangle aside.
d. Cut the trapezoid in half (on the fold).
e. Fold one of the quadrilaterals into a square and a right triangle. Cut apart and set these pieces aside.
f. Fold the remaining quadrilateral into a parallelogram and a right triangle. Cut along the fold to complete the set.



BUDDY MATH

Fourth grade students can successfully act as tutors and mentors for younger students in your school. The "Buddy Class" program is based on the idea that when a student assumes the role of a model, he /she strengthens his/her understanding and the ability to communicate that understanding. The saying "To teach is to learn twice" is very visible in the "Buddy Class" program.

Planning

Using the 1st and 2nd grade Assessment Profiles and the *Standard Course of Study*, Buddy Teachers can plan activities on the younger students' level that also reinforce basic skills for the older students. Before each Buddy Class meeting, the fourth grade students practice the activities in a role-playing situation. They discuss possible problems the younger buddies may have with the activity and ways to help them understand. With each meeting the fourth grade buddies sharpen their tutoring skills. After each meeting, the fourth grade students discuss or record in their journals their experiences as teachers.

Grouping

Due to the limited amount to space in one classroom, each teacher divides the class into two equal groups. Each teacher will exchange half of the students for half of the Buddy Class students. Both the younger and older students enjoy visiting the other classrooms.

If one class has more students than the other, the teacher can select the students who can handle two buddies. Some teachers assign buddies for a long-time relationship, while others encourage students to work with a different buddy each visit.

Activities

1. A Number Facts Game for Addition or Subtraction

Materials: gameboard, two dice, cubes to cover numbers

Pair a fourth grade student with a younger buddy. Each student takes a turn rolling the dice, then deciding whether to add or subtract the numbers. The first student to cover his board is the winner. ***Extension:*** During the buddy game, have the fourth grade students keep a tally of the sums of the numbers on the dice. The fourth graders then make a graph to show how often each number occurred. The students work as partners and write a paragraph comparing their graphs. Have the partners trade the graphs and using the information presented, write the set of equations one might use to cover the gameboard.

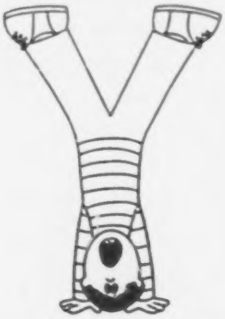
2. *Calculator Fun*

Materials: calculator for each pair of students, paper and pencil

Prior to the buddy class meeting, have fourth grade students design a worksheet using the letters which appear on a calculator when it is viewed upside down. The worksheets include fill in the blank sentences and the numbers that spell each word. Fourth graders work with younger buddies and help them punch in the numbers, turn the calculator upside down and record the word that is shown. ***Extension:*** Using the key, have fourth grade students make crossword puzzles to exchange with a fourth grade partner. The students are encouraged to make challenging clues that include several operations. After solving the equation, the students turn the calculator upside down and write the word in the puzzle.

3. *Footstep Findings*

Materials: paper footprints, pencil, posters labeled ABCD



Have each student trace and cut his/her footprint. Label trees and outside objects with posters marked A, B, C, or D. Pair up a fourth grader with a younger buddy. Have the younger student walk in a straight line, heel to toe, from A to B. The student records the number of footsteps on the paper footprint. The fourth grader then walks from A to B and records the number of footprints he/she took. Encourage the students to discuss why it took one student more steps than the other. Subtract to find the difference.

4. *Pattern Block Cards*

Materials: pattern blocks, paper or poster board, pencil

Prior to their buddy meeting, fourth graders trace pattern block designs on paper. At the top of the paper, each student will make a key for the buddies to use when solving the puzzle. The buddies record their new discovery in a key at the bottom of the paper. Both classes can use the puzzles in their math center. ***Extension:*** Assign a money value for each pattern block suitable for the fourth grade class. have students find the most expensive and least expensive way to cover the puzzle. Write three different combinations to equal that amount. Given a certain money amount, design three puzzles that total that amount.

Do not let what you cannot do interfer with what you can do.

5. *Buddy Store*

Materials: various food boxes, stickers for price tags, paper or real money, calculators or adding machines

Fourth grade students collect various food boxes. Using advertisements and prior knowledge, the students will price each item. The younger students bring their money to the Buddy Store where a buddy helps them shop and estimate when they have spent their limit. Fourth grade students then help their buddies add each item on the calculator or adding machine. The fourth graders are in charge of writing a receipt and returning the correct change. While the students are waiting for others to finish shopping, the older buddies can explain the numbers written on each package, determine which box would hold the most and put the boxes in order according to price, height or largest number written on the package. ***Extension:*** Fourth grade students design their own flier for their store. The group makes an advertisement paper with prices appropriate for the younger buddies. Write interesting story problems and set up a problem solving center in the first grade classroom. They can change the center periodically with spatial problems, measurement tasks, etc.

6. *Graphing Lessons*

Use your buddy class for comparison when graphing. Each buddy class makes a graph and each teacher can use both graphs during a math lesson. Have students write about the information discovered when comparing the graph. Some topics are:

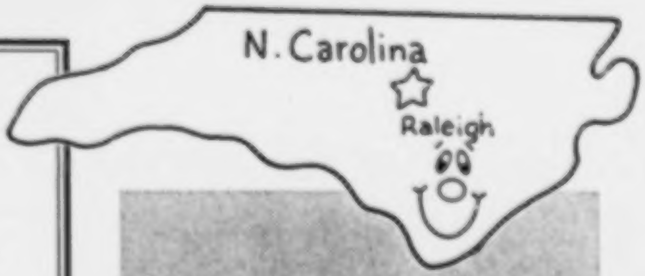
How we get to school
Bedtimes
Favorite vegetable
After school activities
Number of siblings
Favorite subject in school
Birthday month
Favorite color
Future occupation
Least favorite chore
Pets
Favorite North Carolina vacation spot

7. *Additional Ideas*

a. Fourth grade students write books for their buddies with such titles as "First Graders Are So Lucky" or "It's Great To Be Little When . . ."
b. Celebrate the Hundredth Day of school with your buddy class. Write 100 ways to help a buddy.
c. Send a student who needs a boost of self-confidence to your buddy class to read a book.
d. Have fourth grade students present their book reports or science projects to your buddy class.
e. Venture outside for a Math Fun Day with your buddy class. Invite volunteers and your principal to take a station and enjoy working with small groups of fourth graders and their buddies. Students rotate from station to station participating in various math games.
f. Compare a day in grade four with a day in grade one by having buddies from each class make illustrated time lines.

Timely Tips for Instruction

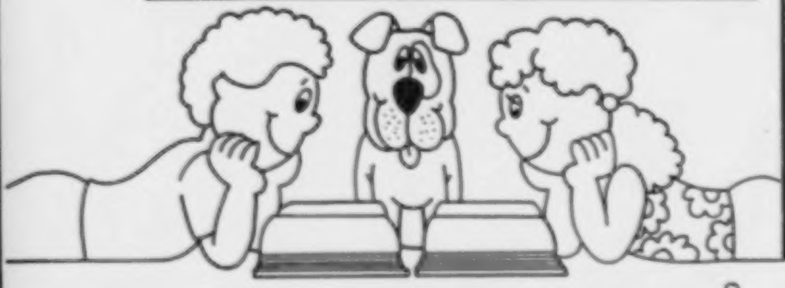
- Instruction should progress from concrete to abstract, making use of manipulative materials at every level.
- Instruction should be concept driven and developmentally appropriate.
- Instruction should allow students to be involved actively in learning.
- Instruction should include the use of cooperative groups.
- Instruction should employ the use of effective questioning techniques that promote student interaction.
- Instruction should be centered around problem solving and decision making.
- Instruction should complement the learning styles of students.
- Use all word problems, exploration, and special projects given in students' textbooks.
- Use creative ways to assign drill.
- Within the class routine, use a variety of instructional strategies.
- Invite your principal to participate in your mathematics lessons.



Mathematics is the study of patterns and relationships, not the memorization of rules.

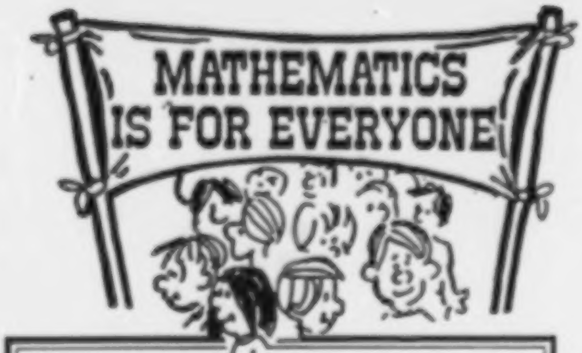
Timely Tips For Review

- Incorporate review into instruction of new content.
- Spiral review throughout the year but use a variety of formats.
- Make reviews short and frequent.
- Allow students to lead short review sessions.
- Make reviews fun, yet challenging.
- Encourage students to make connections within mathematics and with other content areas.
- Analyze errors and target review to student needs.
- Make review quality rather than quantity.



Timely Tips for Working with Groups

- Begin with pairs. Limit groups to a maximum of four.
- Use heterogeneous grouping as much as possible. Vary the members of the group every two - three weeks.
- Be sure all members of the group can see one another to talk and share materials.
- Have simple rules but enforce them:
  - a. Ask the teacher for help only when everyone has the same question.
  - b. Listen to others.
  - c. Talk quietly as you work.
  - d. All students should participate.
  - e. Be considerate and help others.
  - f. Everyone should agree on the final result.
- Assign roles sometimes to build group interdependence and promote involvement. Some possible roles are:
  - a. Group recorder
  - b. Group reporter
  - c. Materials manager
  - d. Discussion leader
- Expect a higher noise level. Listen to studens' discussions.
- Do not interrupt a group that is working well.
- Help groups to evaluate and monitor their work. **Expect quality work.**
- Evaluate individuals as well as the group.
- Model and monitor games with the entire group/class before having students play independently.
- Make groups responsible for materials and their behavior.



Timely Tips for On-Going Support

- Create a newsletter for teachers about mathematics and send additional lesson tips.
- Host a parent information session that is a hands-on workshop (not a gripe session). Use ideas from Family Math or have parents rotate through stations.
- Continue to create examples of open-ended and multiple choice questions that relate to the *Standard Course of Study* and go beyond factual recall.
- Show Marilyn Burns video tapes and plan follow-up discussions. Six tapes focus on manipulatives for grades 2-5, three are middle school tapes, and three new elementary tapes are available. All model good instructional practices and include discussion guides.
- With other teachers plan lessons which integrate goals and objectives from several content areas or several strands in mathematics. Build a file of "best lessons" and share with others.

The challenge is clear.
The direction is certain.
The time is now!

Timely Tips for Using Manipulatives

- Use manipulatives at all grade levels.

- Use manipulatives that are adaptable in different contexts and are easy for students to work with.

- Use manipulatives that are cost effective and durable.

- Use manipulatives that clearly represent mathematical ideas.

- Use manipulatives that engage as many of the senses as possible.

- Relate work with manipulatives to records made with symbols.

HOW DOES ONE LEARN MATHEMATICS?

I. THE DEVELOPMENTAL PHASE

STAGE 1. - **CONCRETE**

(USE OF MANIPULATIVES WHICH SERVE AS PHYSICAL REPRESENTATIVE OF MATHEMATICAL CONCEPTS)

STAGE II - **TRANSITIONAL**

(SEMI-CONCRETE; USE PICTURES OF MODELS)

STAGE III. - **ABSTRACT**

(EXCLUSIVE USE OF SYMBOLISM : CULMINATES IN THE ESTABLISHMENT OF GENERALIZATIONS WHICH ARE THE "RULES", "DEFINITIONS" AND "ALGORITHMS" OF MATHEMATICS)

II. THE DRILL AND PRACTICE PHASE

III. THE APPLICATION/PROBLEM SOLVING/TRANSFER PHASE

If practice makes perfect, give students practice in thinking and reasoning.

Good assessment is good instruction with an evaluation added.

Timely Tips for Assessment

- Make on-going assessment an integral part of teaching.

- Involve students in self-evaluation.

- Develop problem situations that require the applications of several mathematical ideas.

- Use multiple assessment techniques, such as portfolios, observations, performance, and interview along with traditional assessments.

- Include an open-ended question on all student tests.

- Assess mathematical disposition, different kinds of mathematical thinking, and student interest, curiosity, and inventiveness in "doing" mathematics.

- Assess students' ability to determine an appropriate procedure and to generalize solutions.

- Use assessment data to help students learn and to improve the mathematics program.

- Teach students to evaluate their written work using a holistic scoring rubric.

- Incorporate technology into your assessments through the use of audio and video tapes.

Some mathematics becomes more important because technology requires it.

Some mathematics becomes less important because technology replaces it.

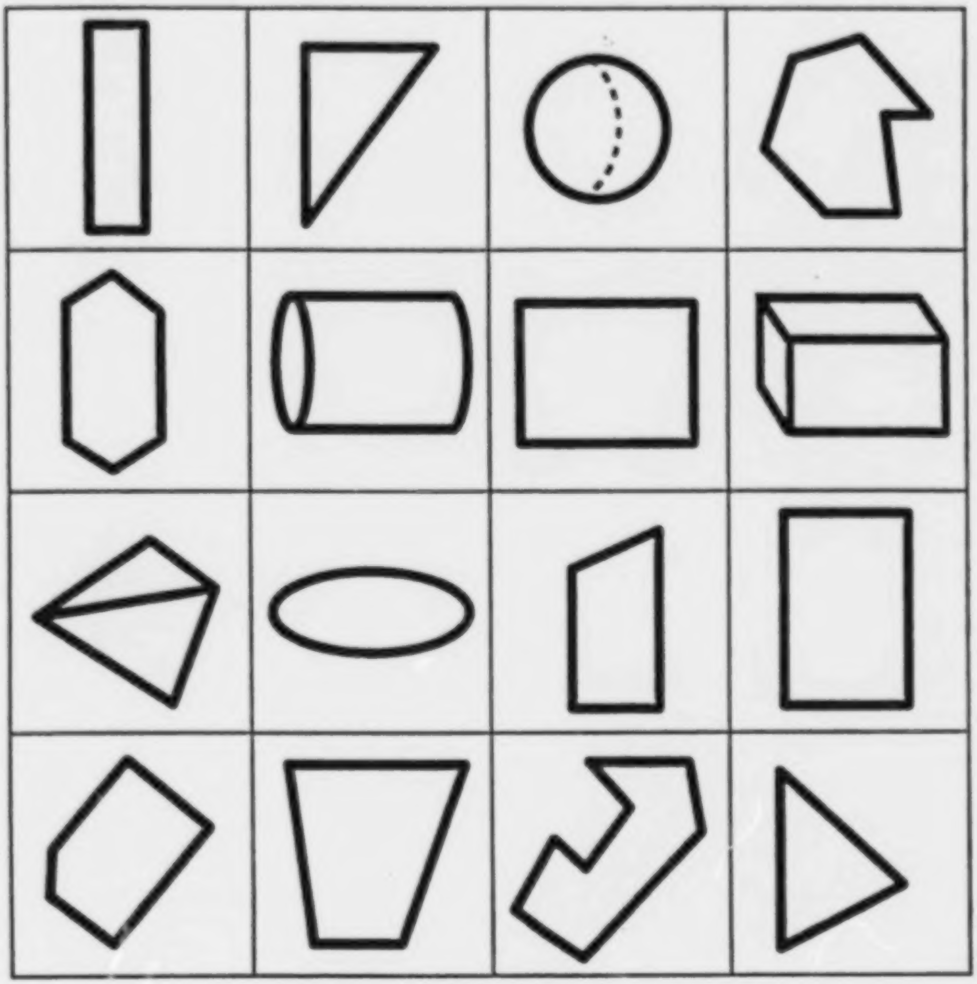
Timely Tips for Communication

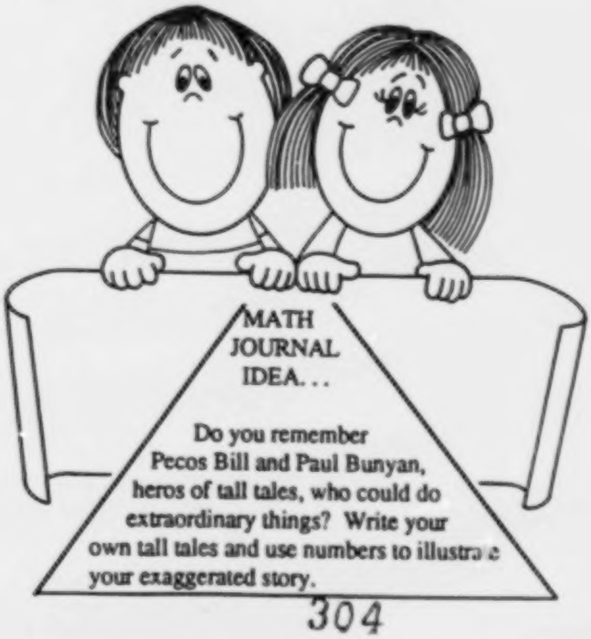
- Use communication to relate physical materials, pictures, and diagrams to mathematical ideas.
- Encourage students to relate their everyday language to mathematical language and symbols.
- Teach students to reflect on and clarify their thinking about mathematical ideas and situations.
- Teach students to model situations using oral, written, concrete, pictorial, graphical, and algebraic methods.
- Discuss mathematical ideas and assist students in making conjectures and convincing arguments.
- Encourage students to describe their mathematical experiences.

Timely Tips for Effective Use of Technology

- Develop a calculator policy and require calculators.
- Encourage student exploration with the calculator. Ask open-ended questions.
- Use the calculator sparingly to check paper-and-pencil computation.
- Allow students to use calculators in problem-solving situations as a method of teaching basic skills.
- Discuss proper handling and care of calculators with students.
- Provide sufficient time and various activities for using calculators.
- Use manipulatives to teach concepts and calculators to reinforce students' understanding of the meanings of operations and algorithms.
- Allow students to participate in problem-solving decisions at the computer, working in pairs or groups.
- Select software that promotes students' active exploration of their environment and enriches learning experiences.
- Experiment with different uses of the computer; devise a management plan for the computer center.
- Engage students in computer-assisted analysis of realistic problem situations.

BEST COPY AVAILABLE

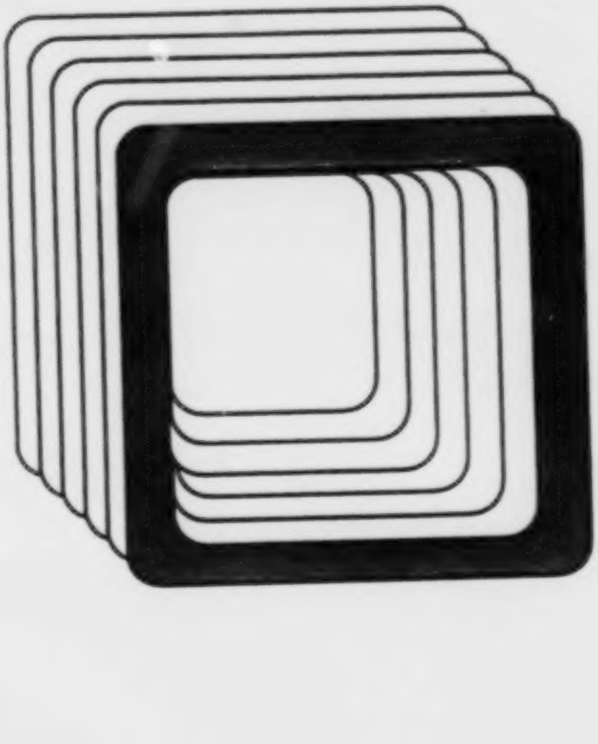




MATH
JOURNAL
IDEA. . .

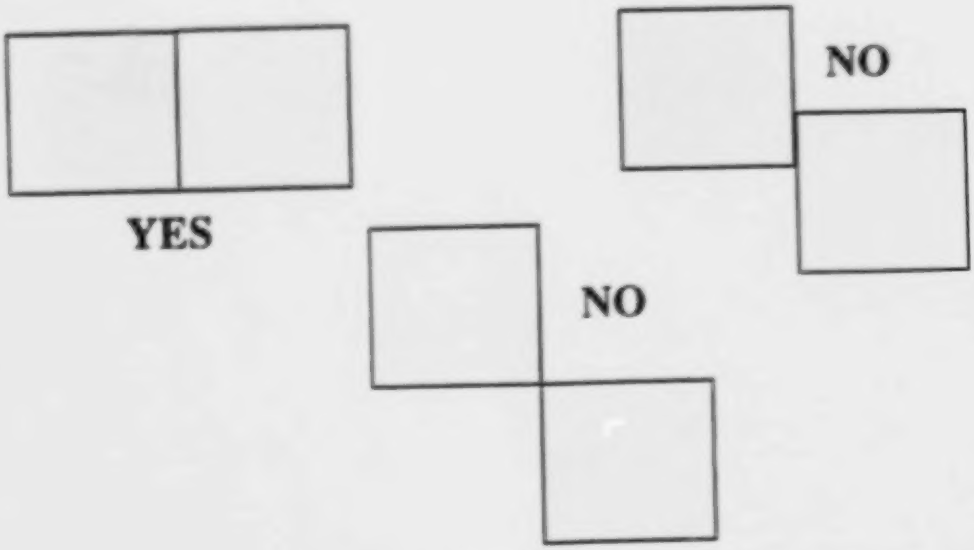
Do you remember
Pecos Bill and Paul Bunyan,
heros of tall tales, who could do
extraordinary things? Write your
own tall tales and use numbers to illustrate
your exaggerated story.

BLACKLINE MASTERS



Exploring Cubes While Making North Carolina History Blocks

1. Using graph paper, challenge students to find all of the ways six squares could be put together. The edges must match and each square be attached by a full side to at least one other.



If a figure may be matched to another by flipping or rotating, it is considered the same figure.

2. Have students cut their hexominoes out and sort into groups: those which will fold into a cube and those which will not fold into a cube. Use this opportunity to talk about classification.

3. As students experiment with folding their hexominoes, have them predict which sides will be opposite each other and which will be adjacent when the cube is made and then check their projections.

4. **Make North Carolina cubes:** Using their small hexominoes as patterns, have students make a hexomino with large squares. Write and illustrate facts about North Carolina places, people, and events on each side. Each cube should be about only one topic. For example, a cube could feature North Carolina products or rivers in North Carolina or Old Salem.

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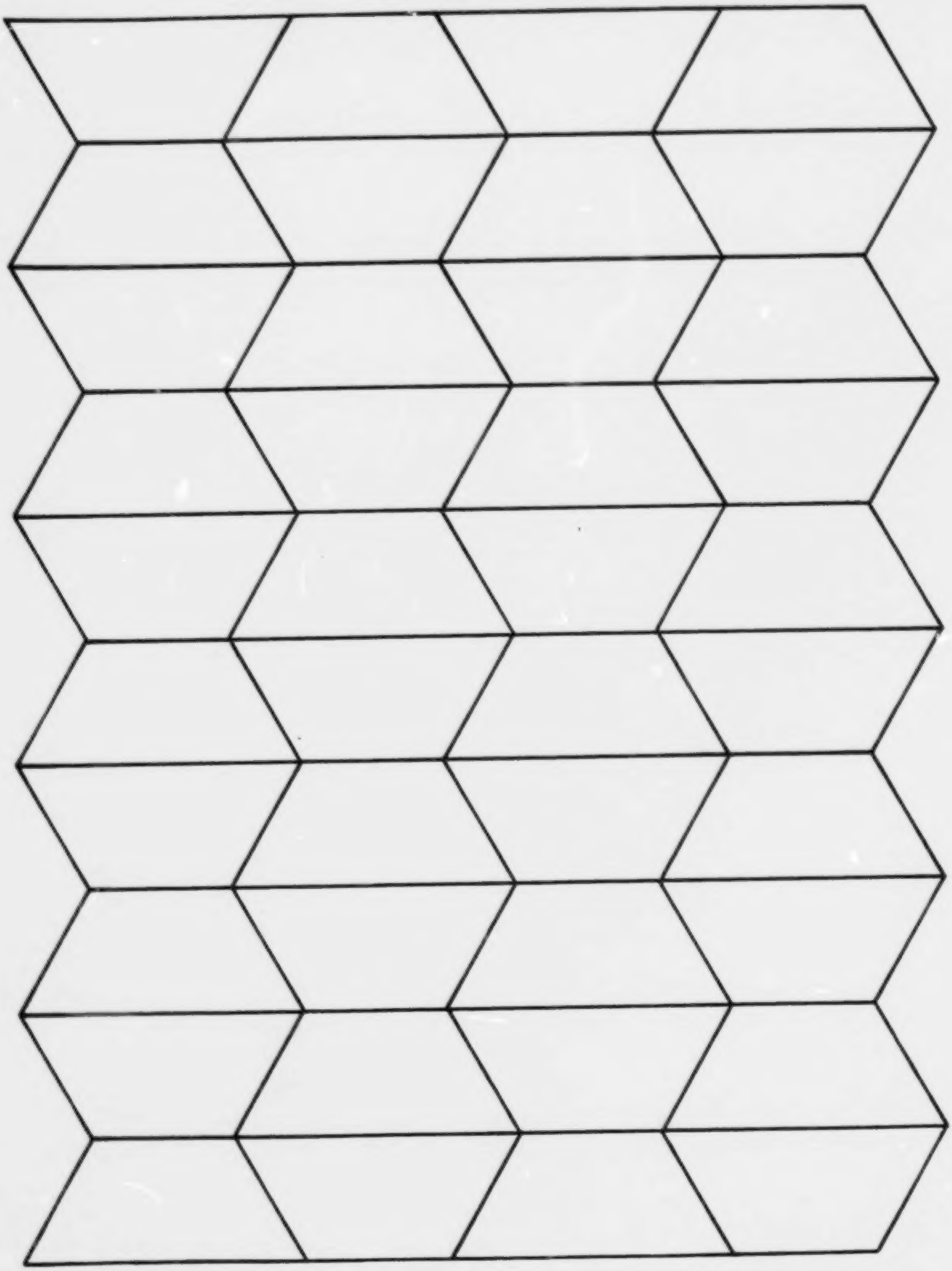
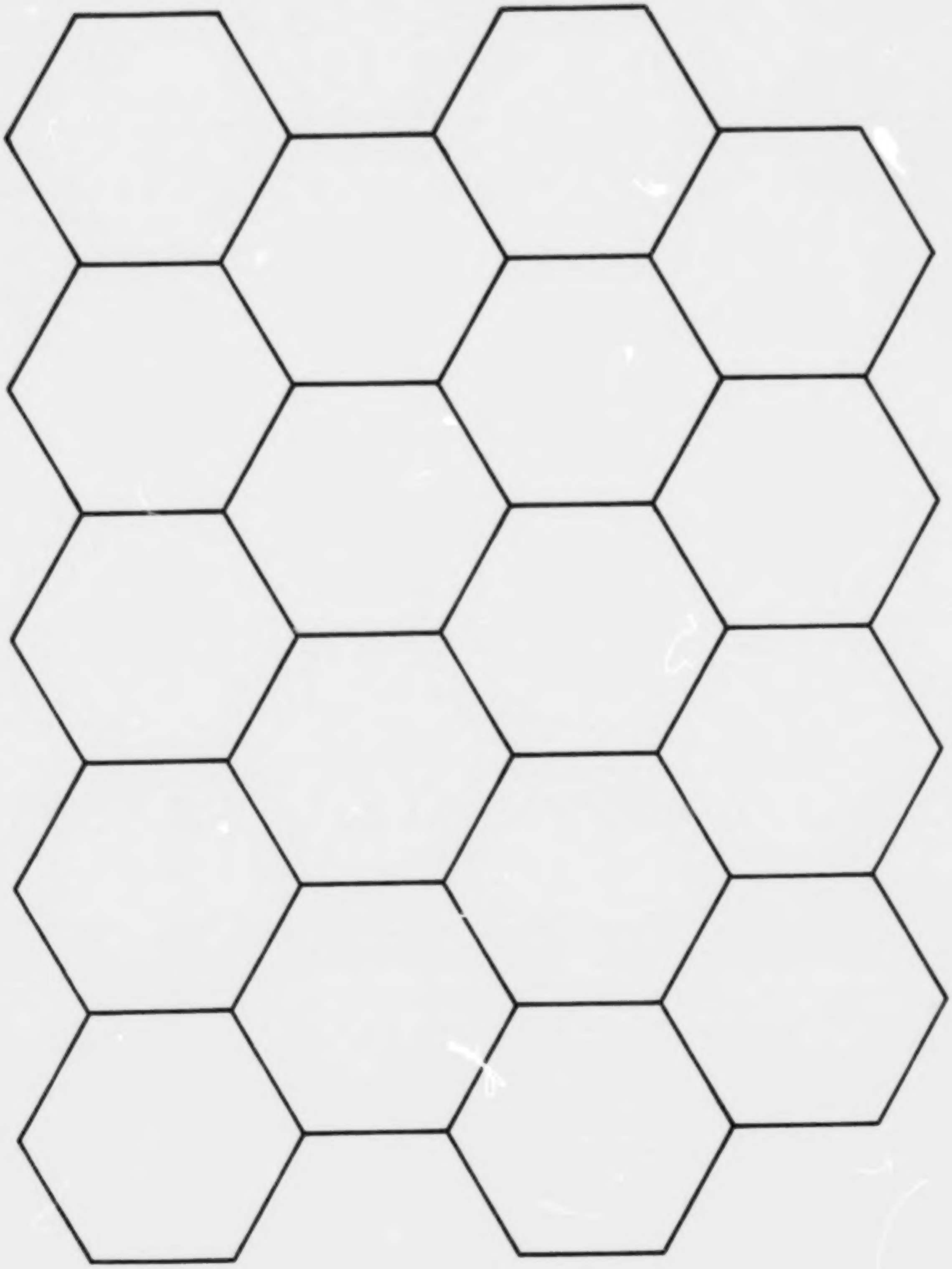
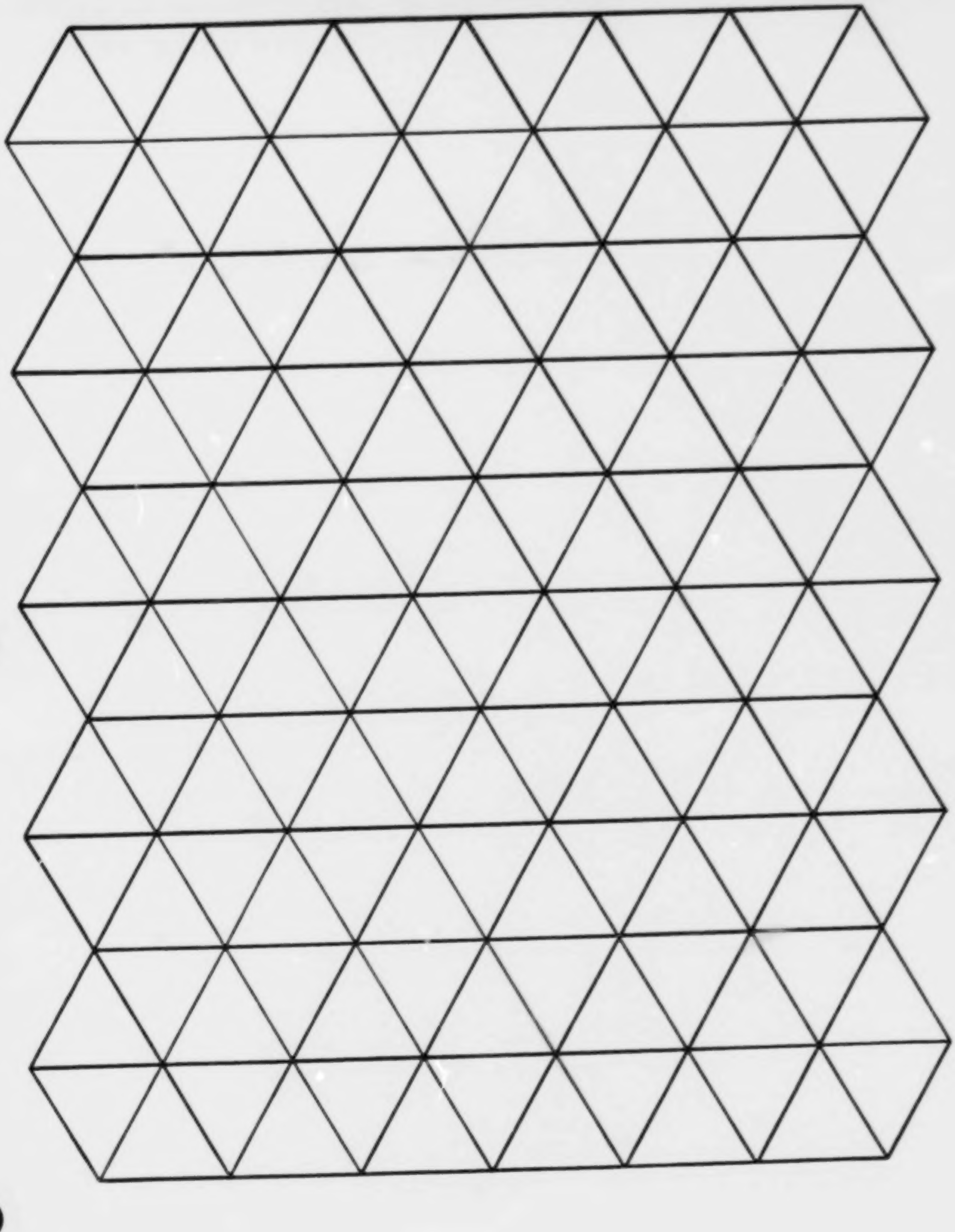


HEXAGON GRID



EQUILATERAL TRIANGLE GRID



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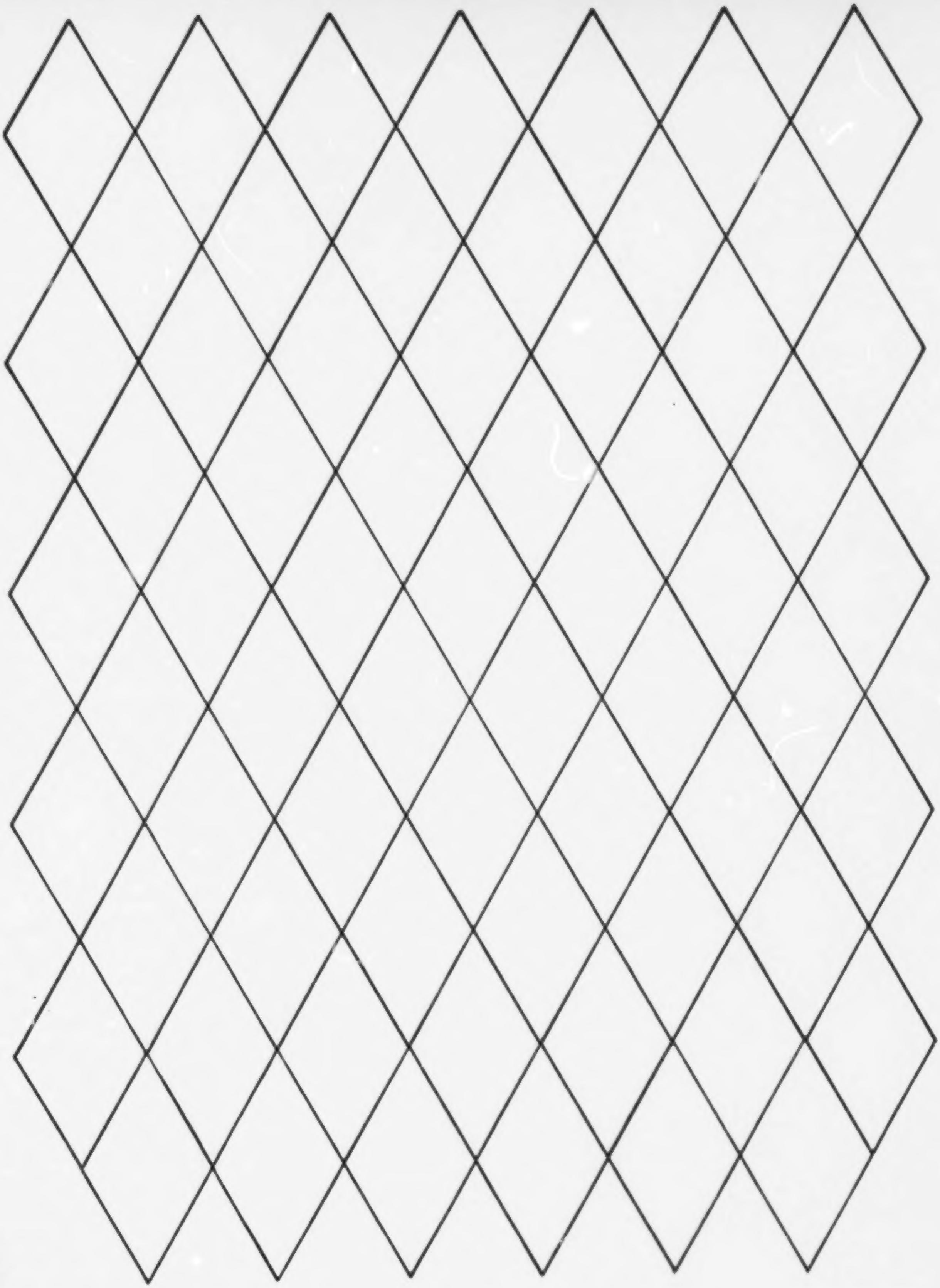
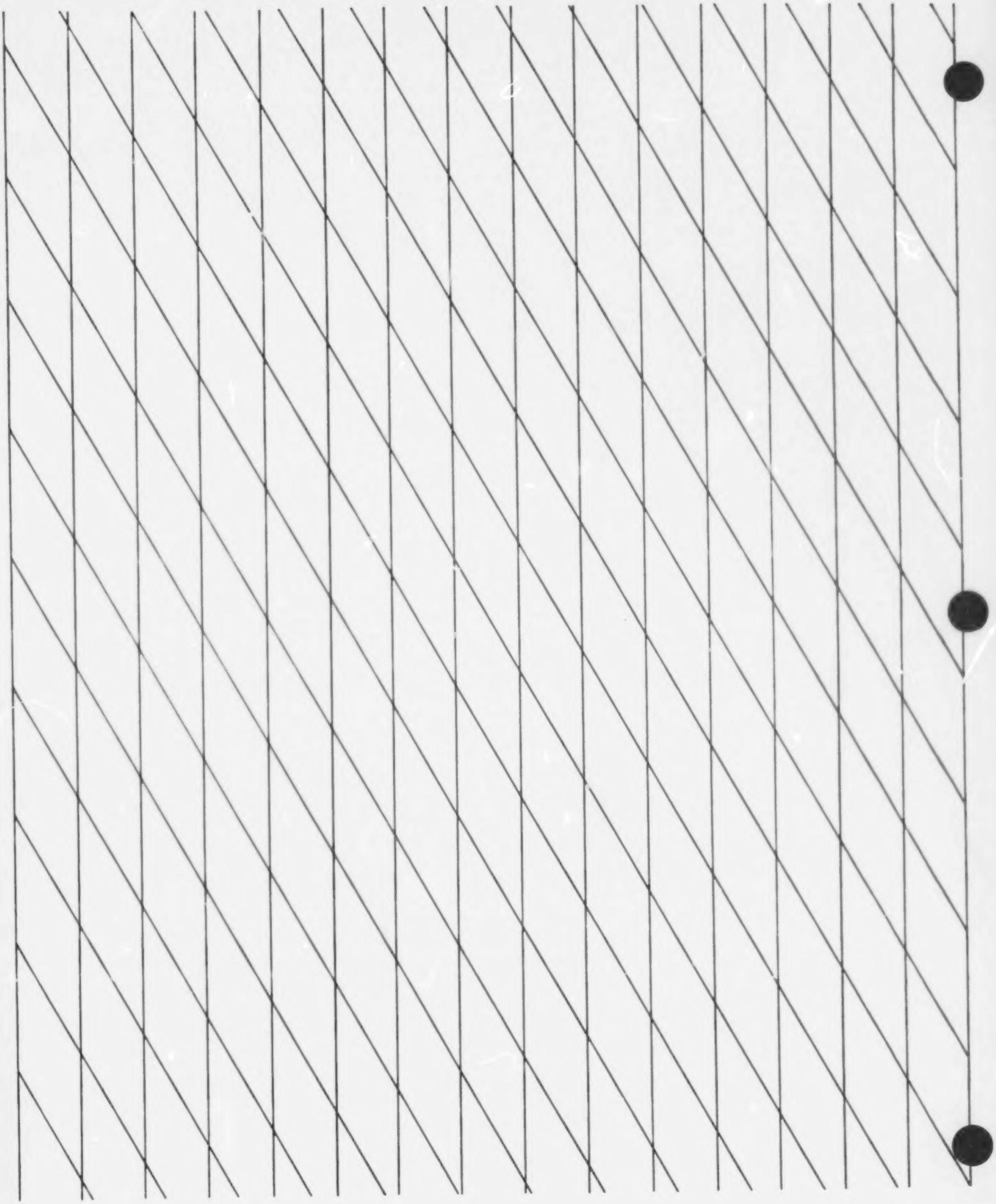
SQUARE GRID

PARALLELOGRAM GRID



RHOMBUS GRID



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GEOBOARD DOT PAPER

ISOMETRIC DOT PAPER

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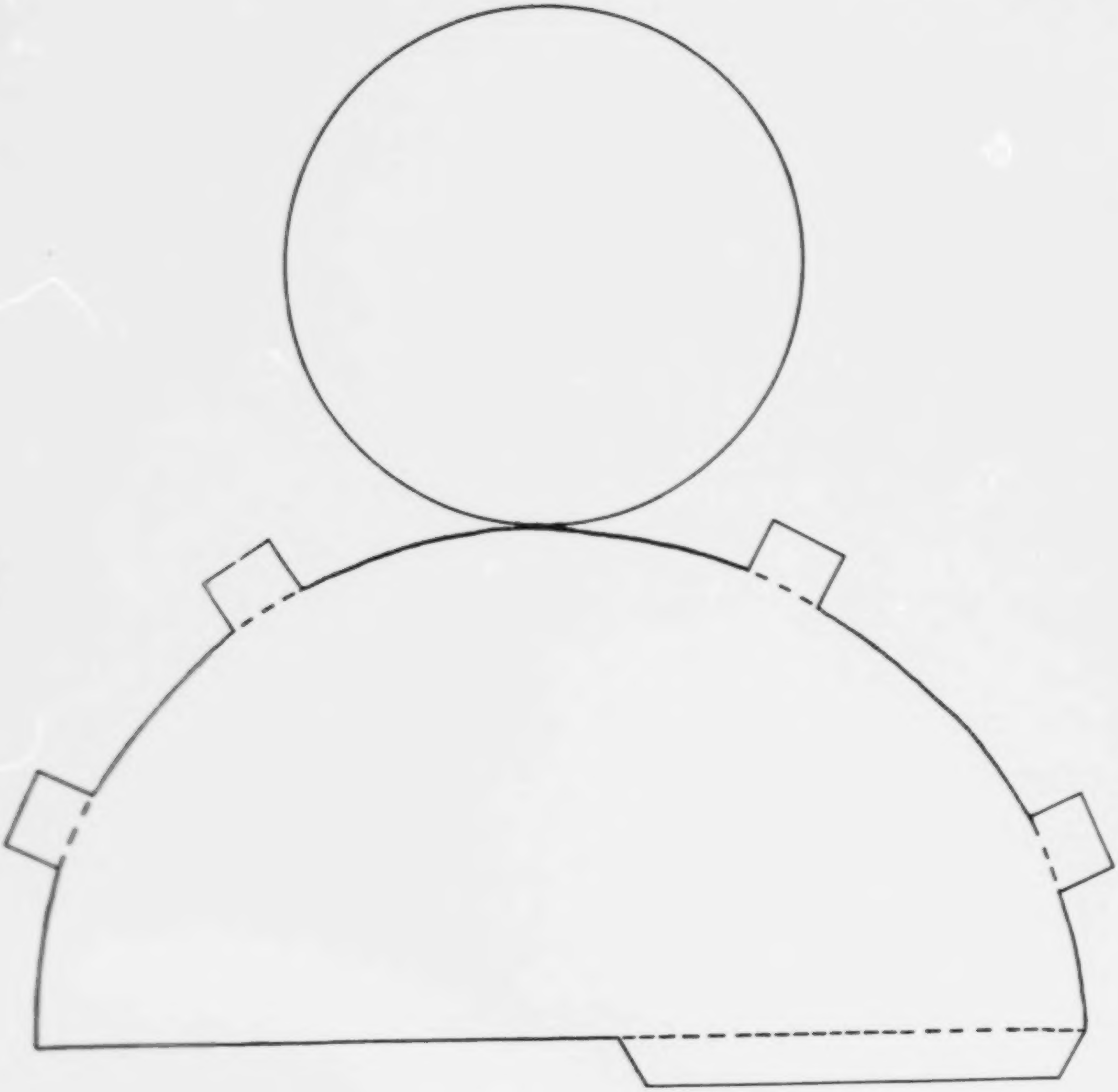
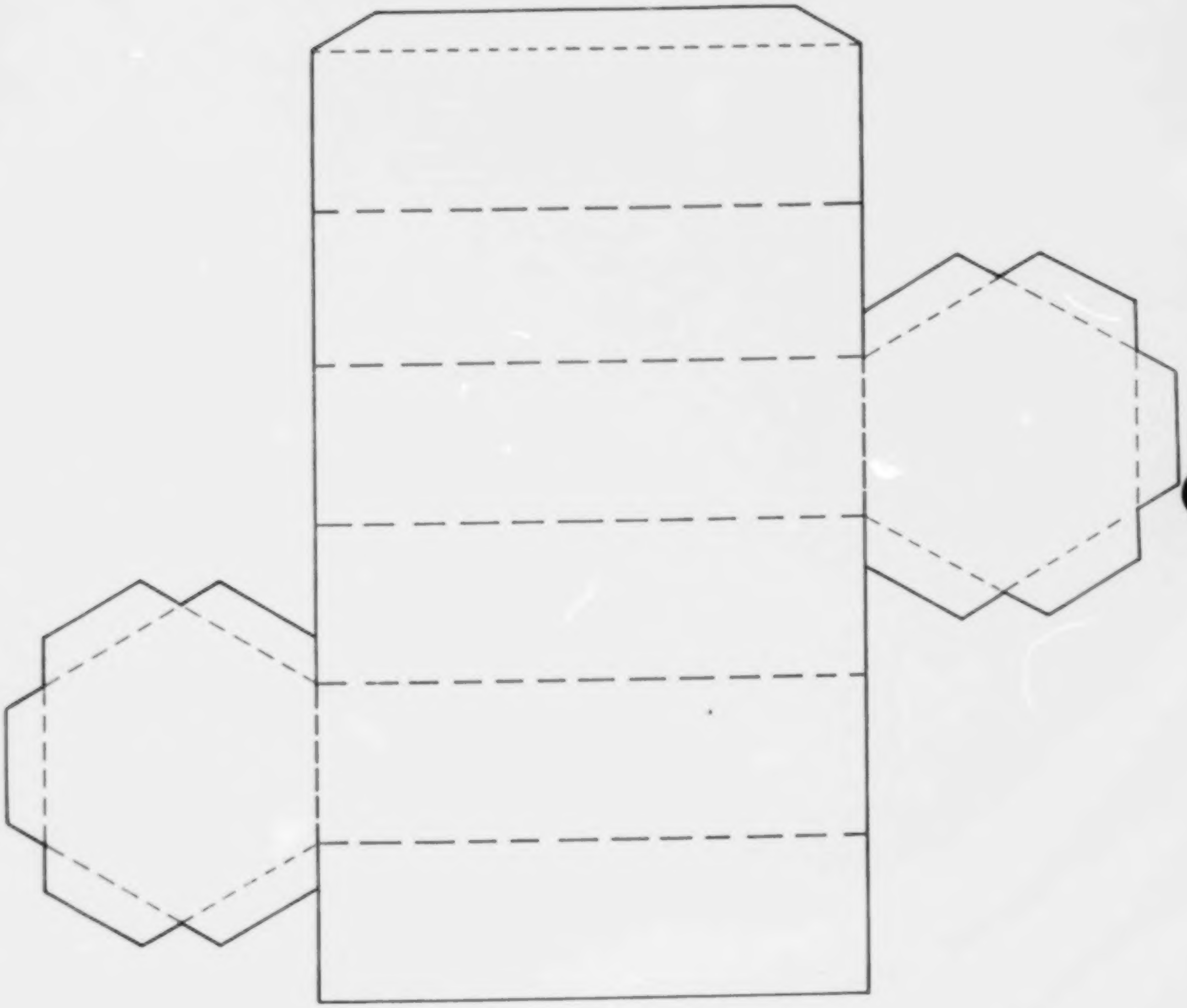
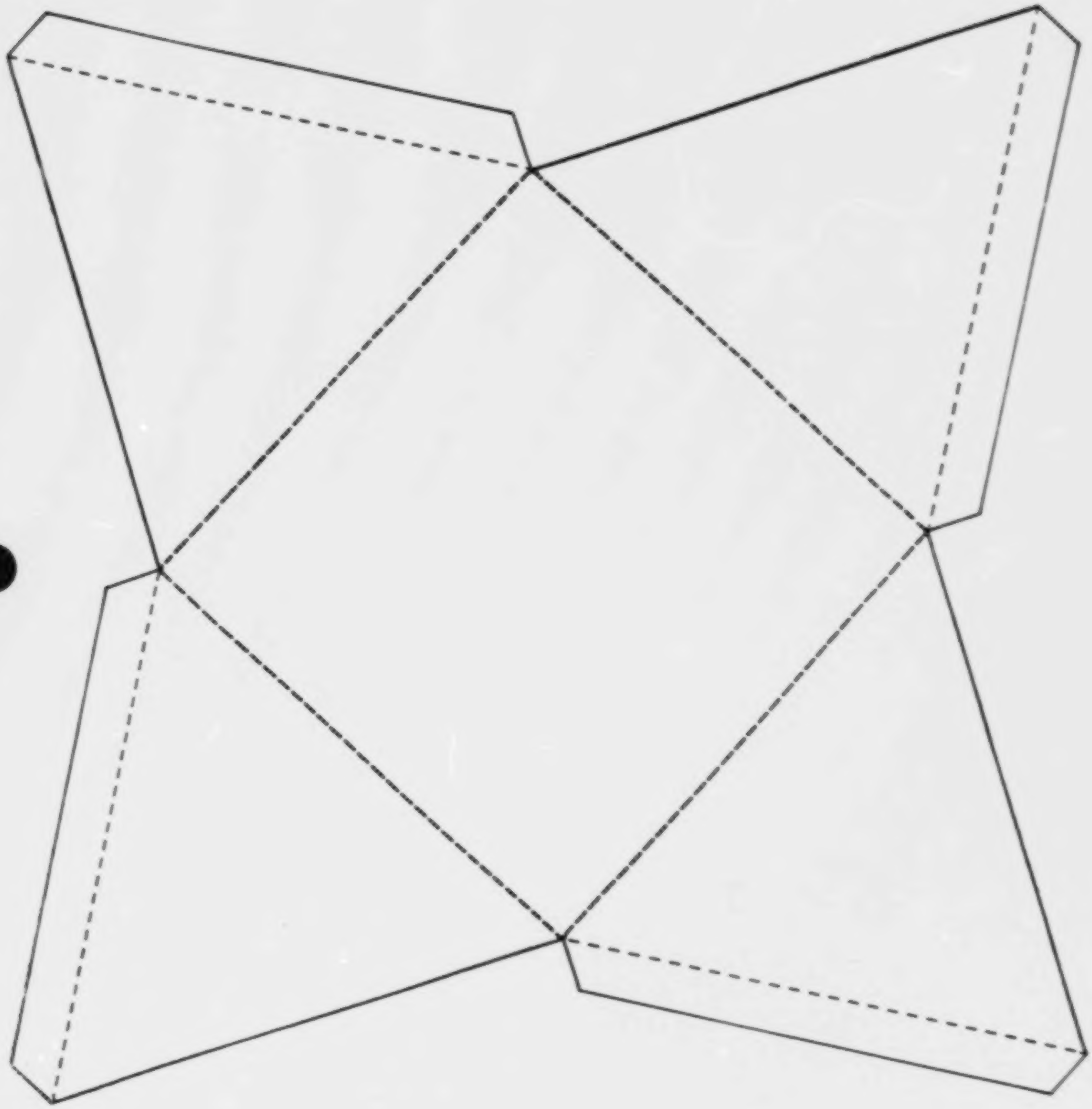


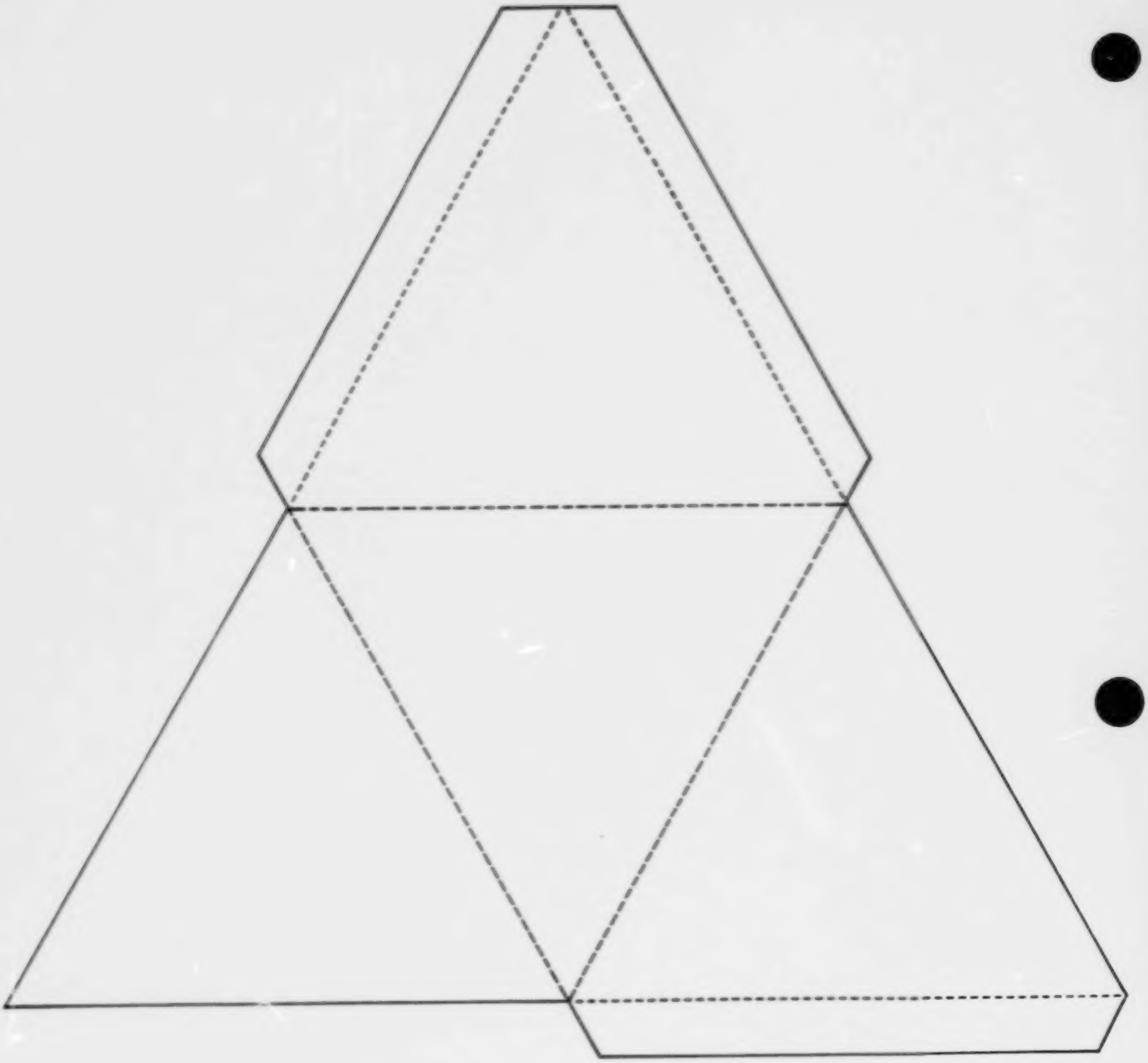
RIGHT HEXAGONAL PRISM PATTERN

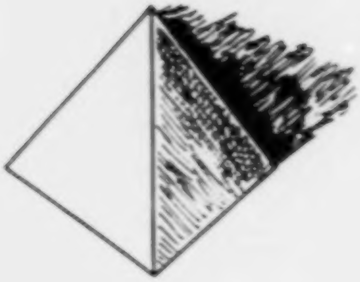


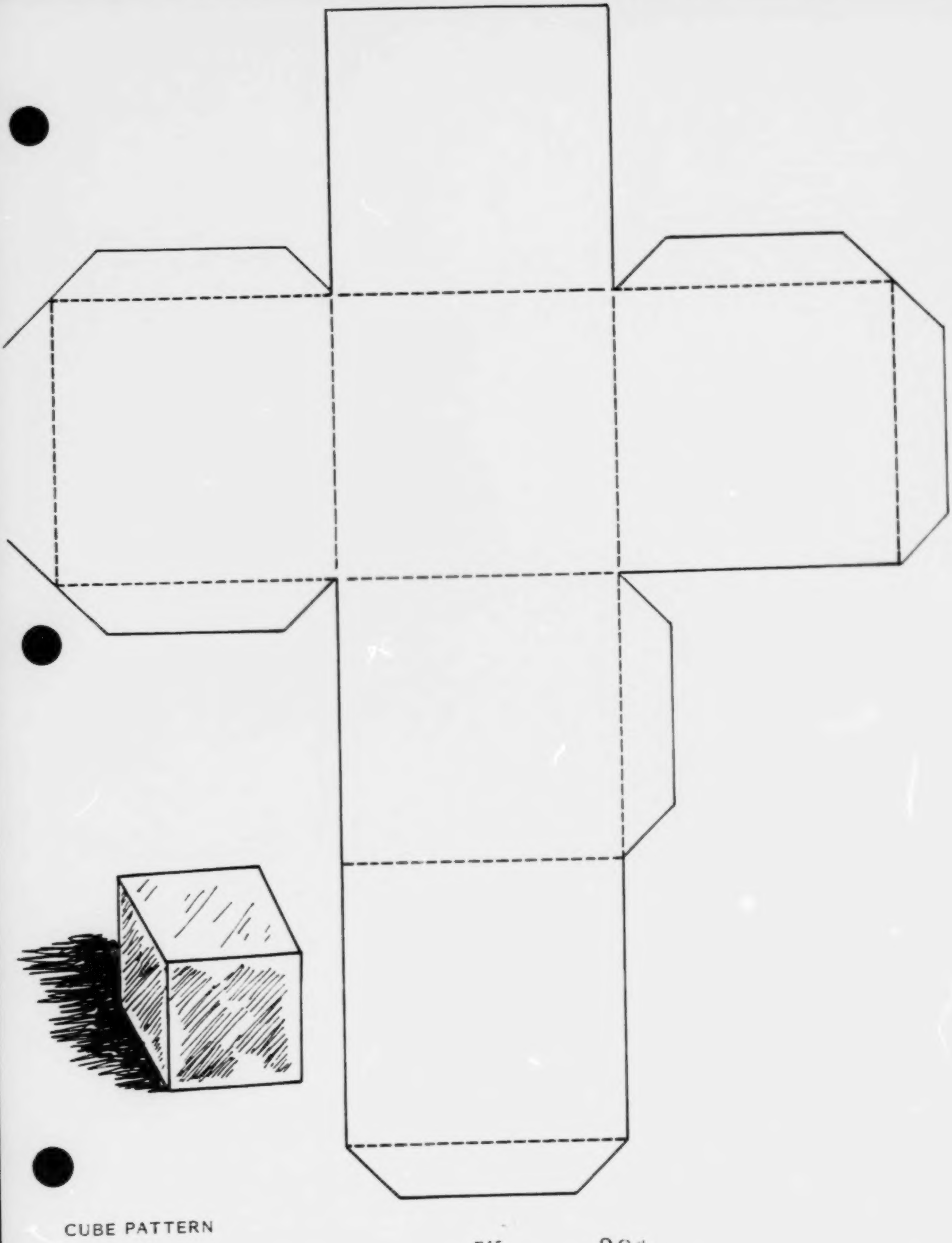
SQUARE PYRAMID PATTERN



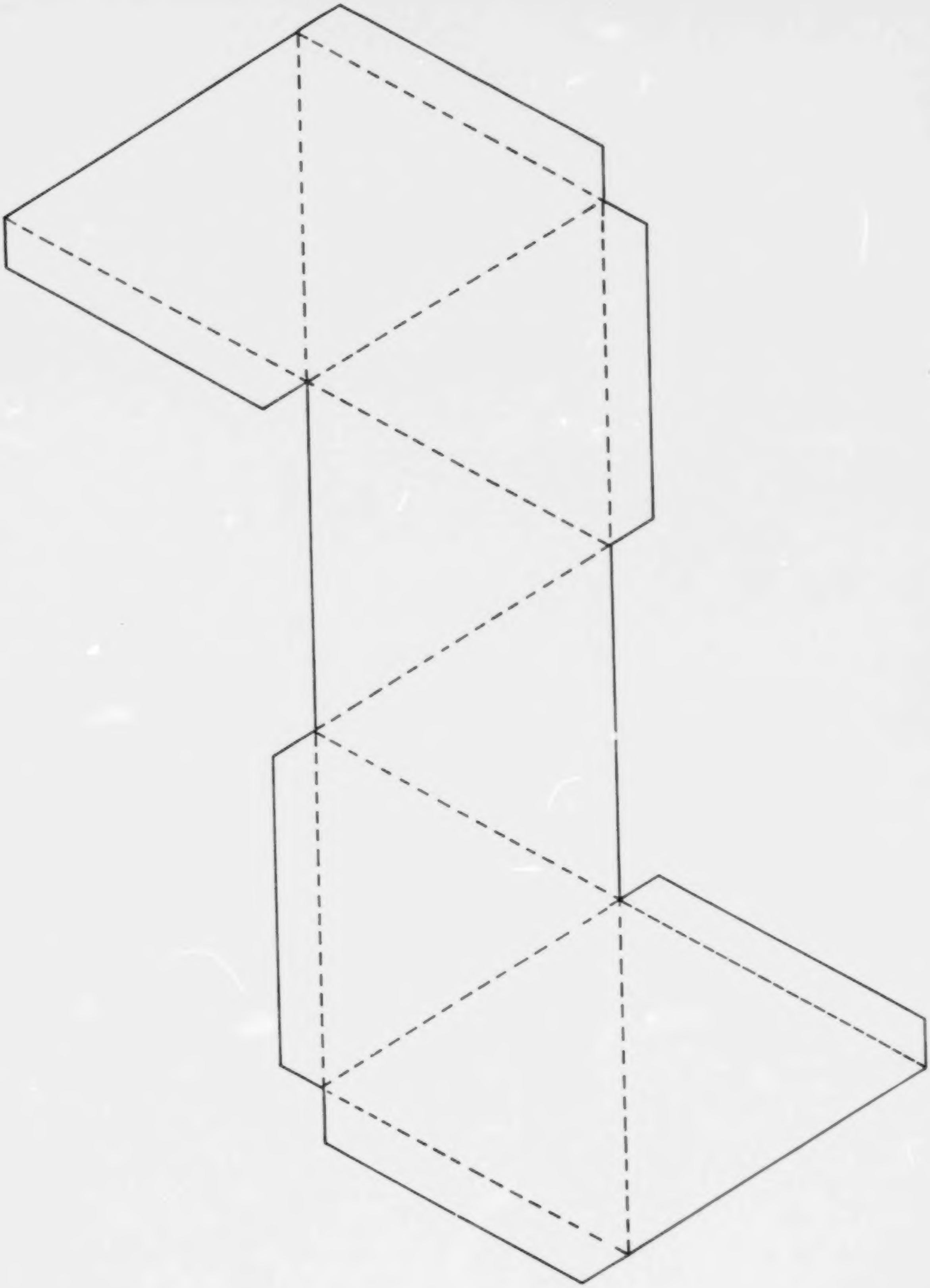
TETRAHEDRON PATTERN





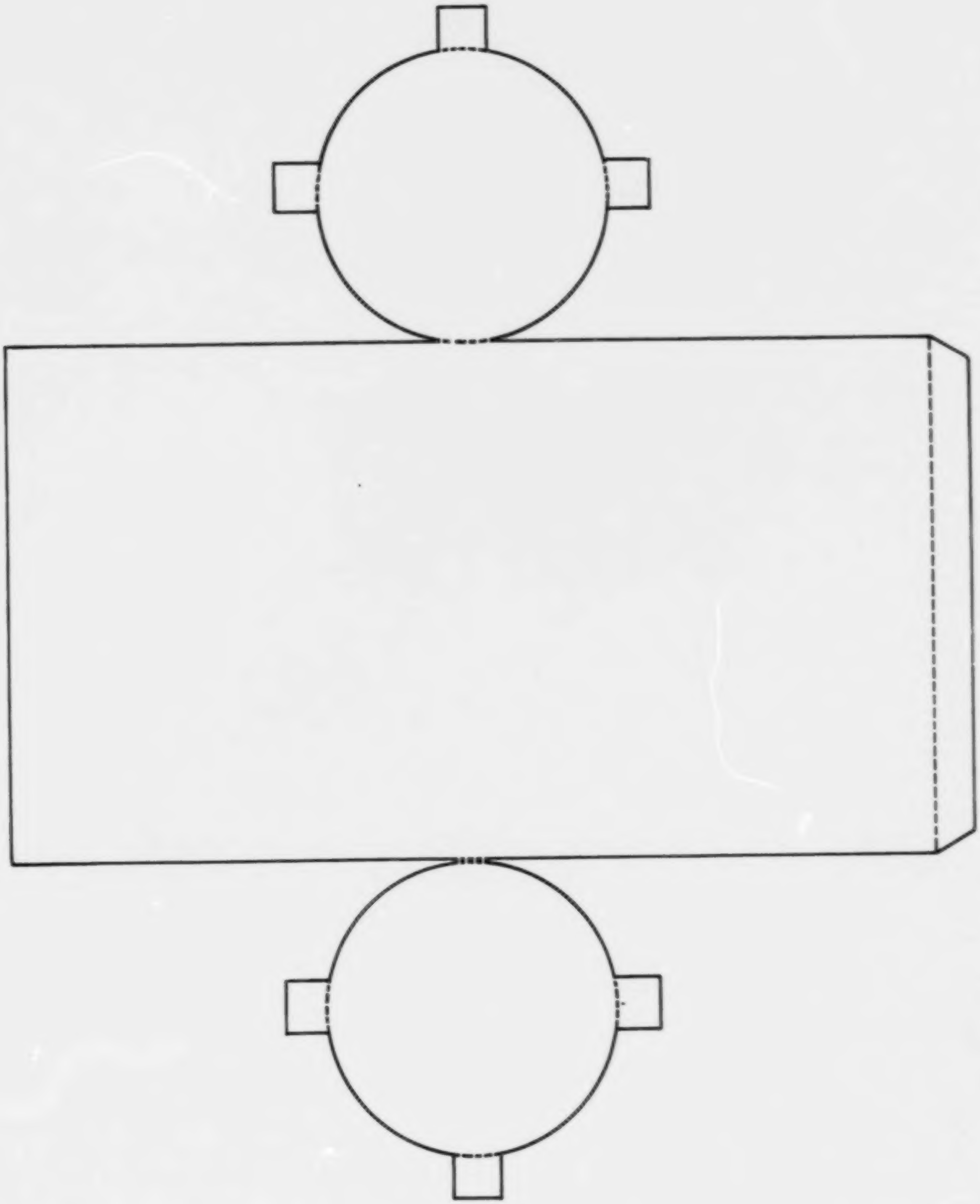


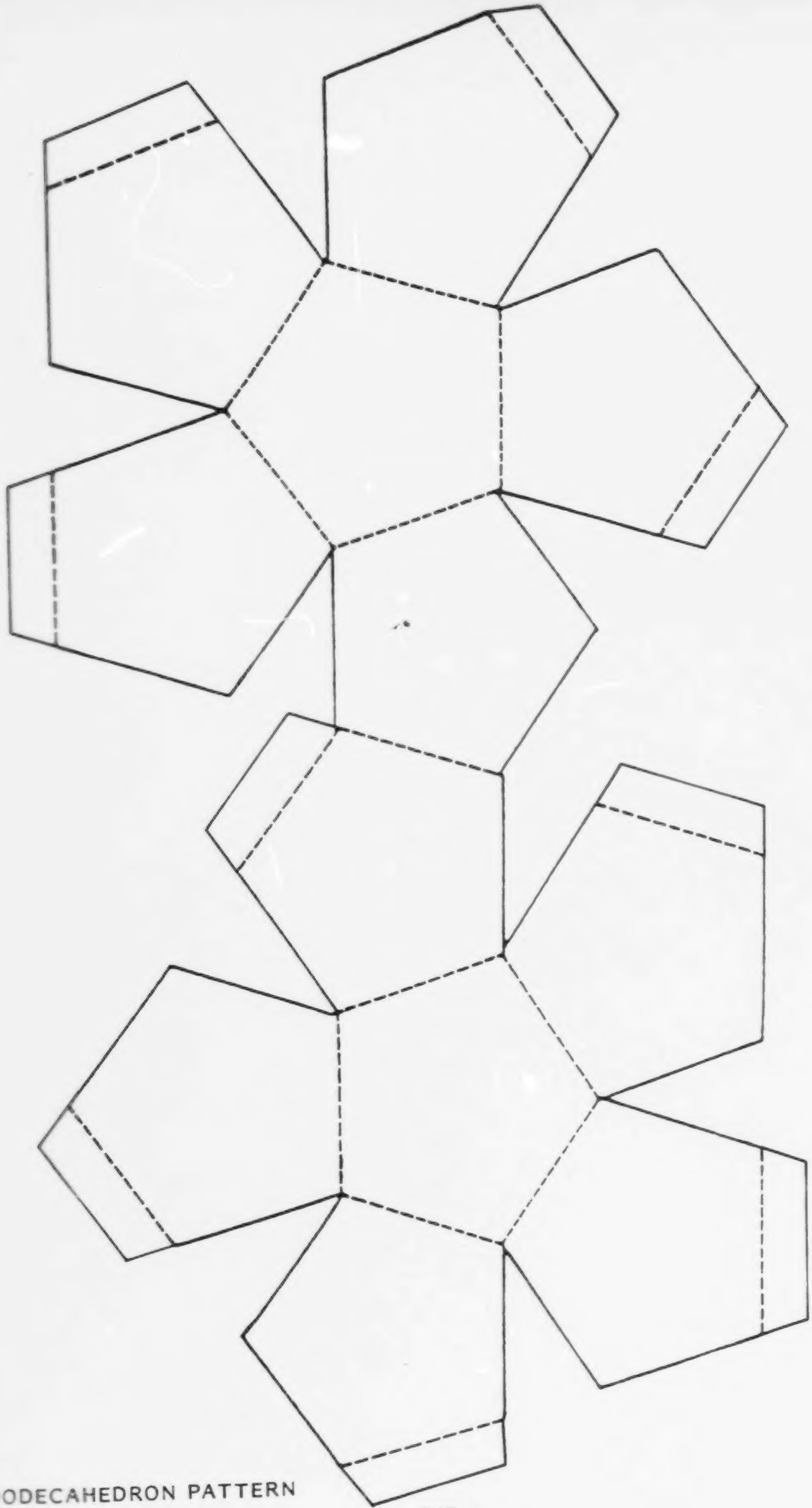
CUBE PATTERN



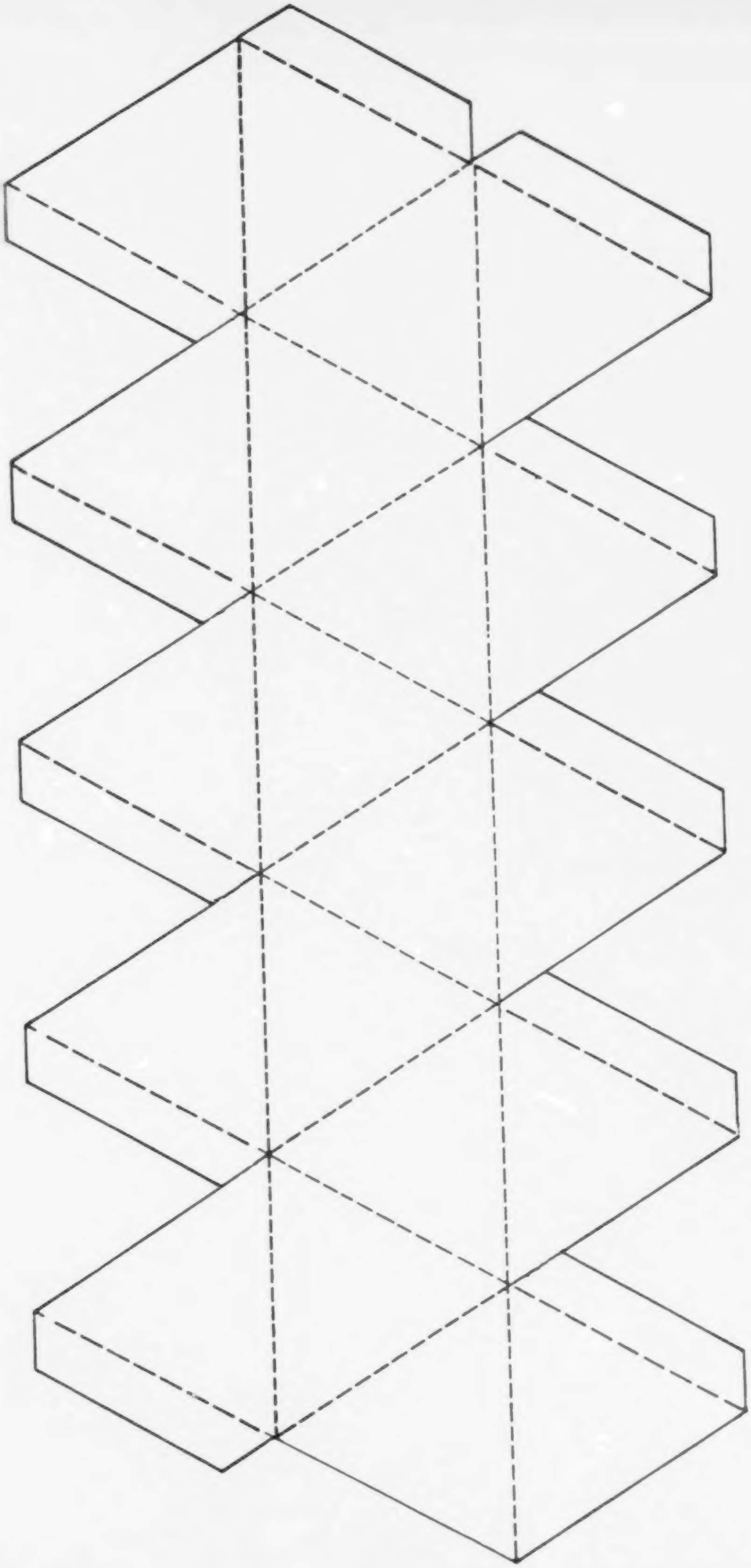
OCTAHEDRON PATTERN

RIGHT CIRCULAR CYLINDER PATTERN

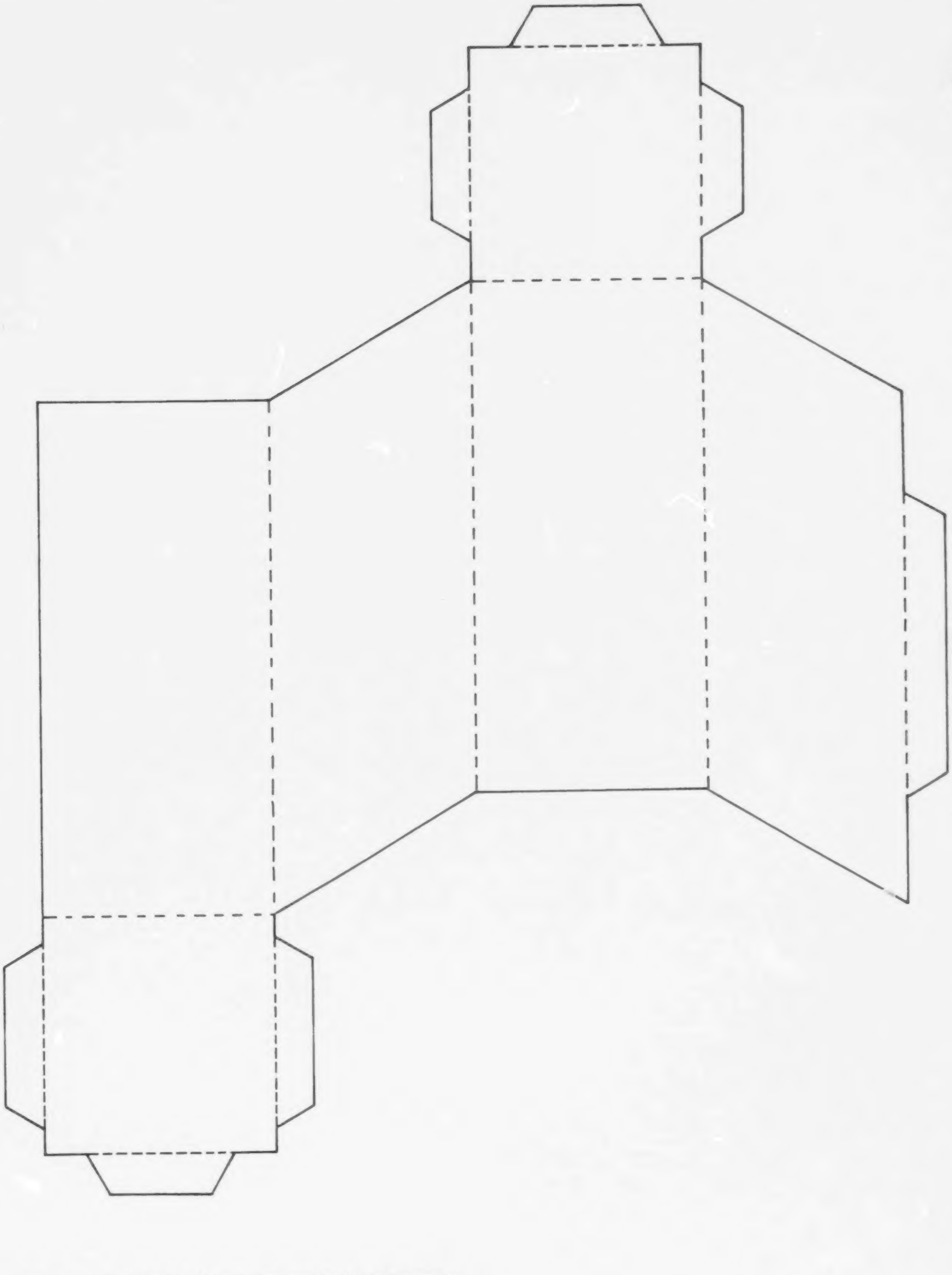




DODECAHEDRON PATTERN

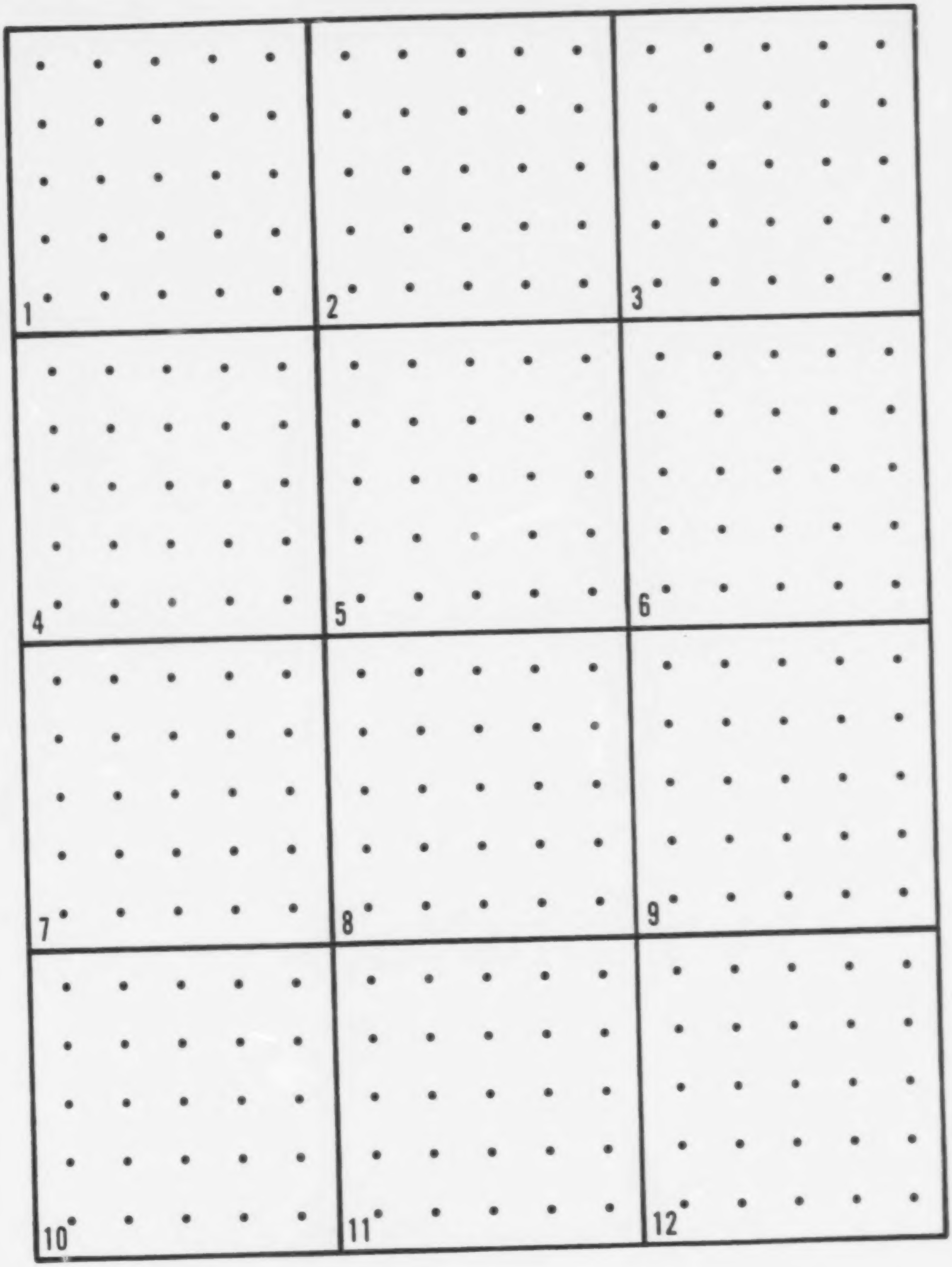


ICOSAHEDRON PATTERN



OBLIQUE RECTANGULAR PRISM PATTERN

GEOBOARD RECORD SHEET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DECODING STUDENT NAMES

A	K	U
B	L	V
C	M	W
D	N	X
E	O	Y
F	P	Z
G	Q	
H	R	
I	S	
J	T	

1. In the activity, students decode the letter construction of their names according to the KEY below, and then compute the value. Following that, the class should compile group statistics including the measures of central tendency, mode and median, and the range.

KEY	POINT VALUE
Obtuse Angle	**8**
Acute Angle	**7**
Right Angle	**6**
Parallel Lines	**5**
Perpendicular Lines	**4**
Intersecting Lines	**3**

Example: The letter **I** is worth 37 points.
4 right angles = 24
1 set of parallel lines = 5
2 perpendicular lines = 8

TOTAL: 37

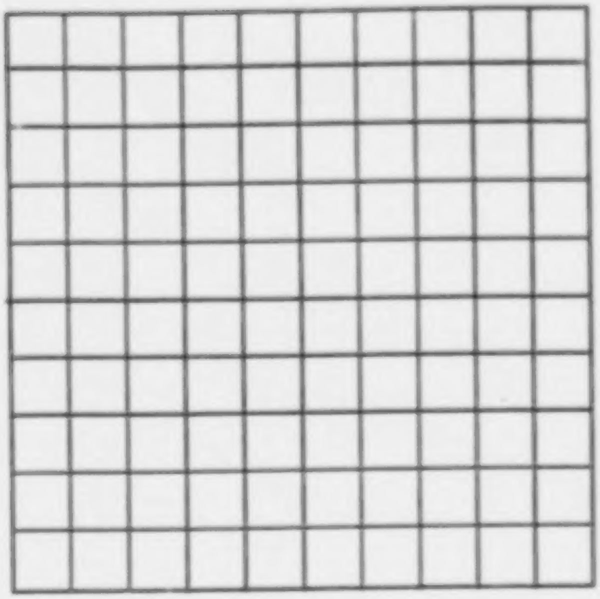
2. Find the letter that is worth the most according to this key. Are there any letters without value?

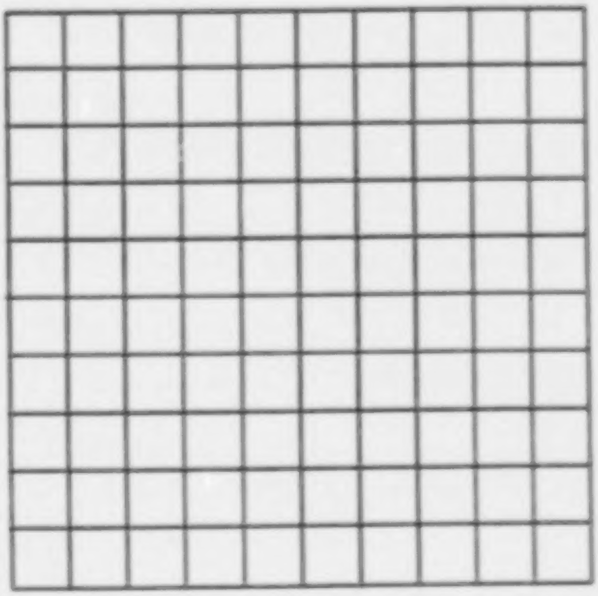
3. What would "North Carolina" be worth?

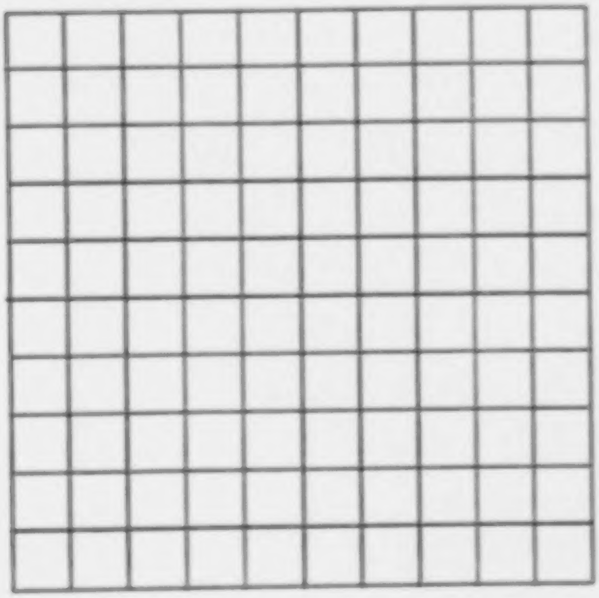
Adapted from Arithmetic Teacher, November 1975.

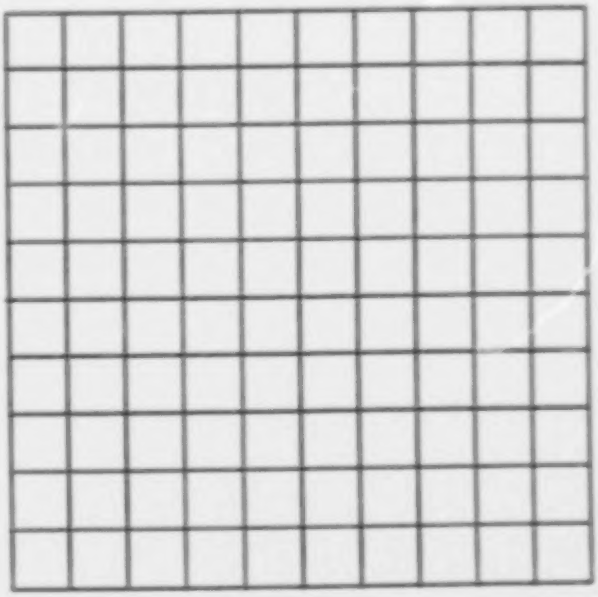
Decimal Models -Units

Decimal Models - Hundredths

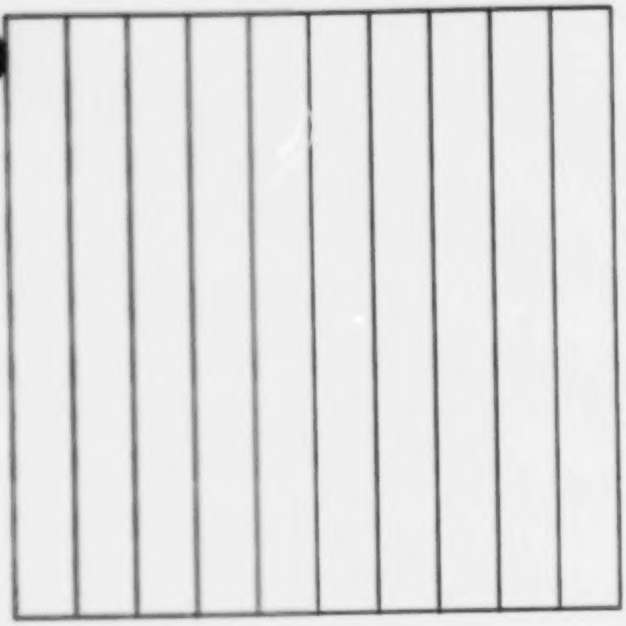


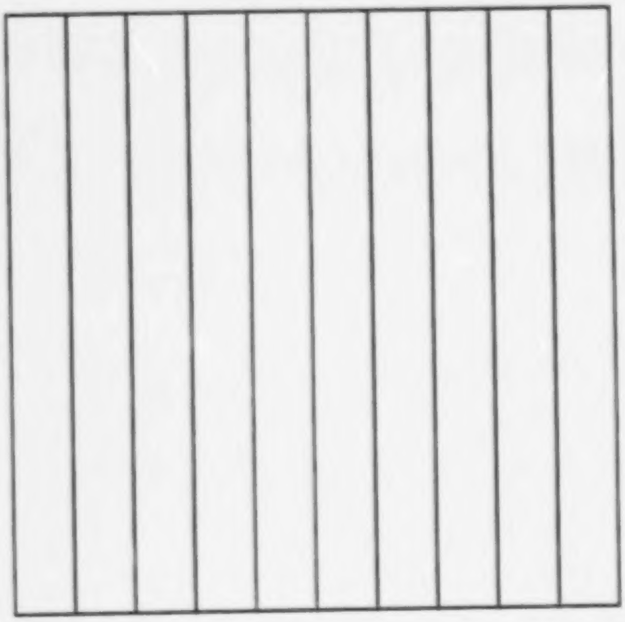


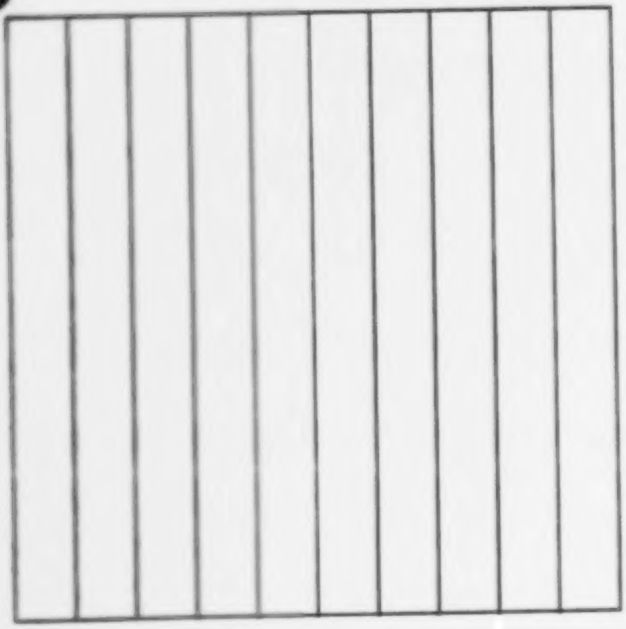


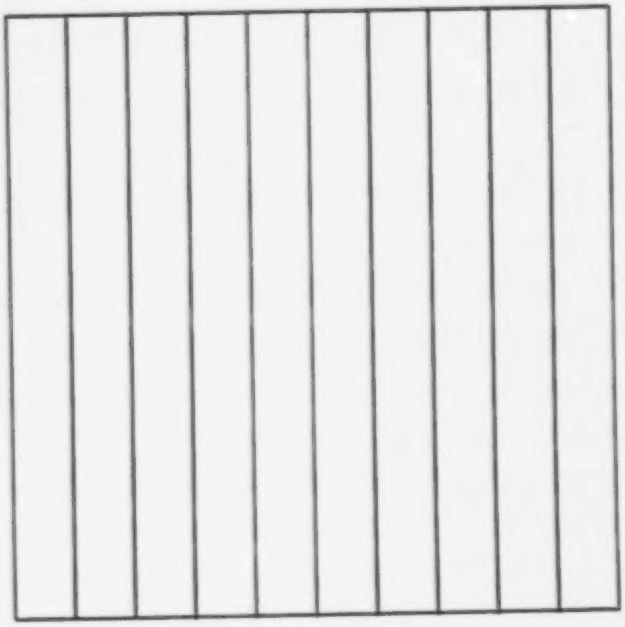


Decimal Models - Tenths



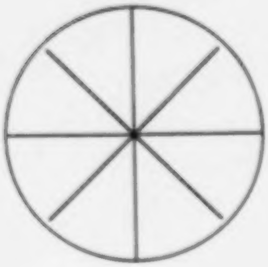
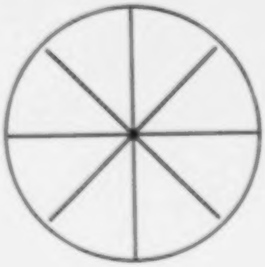
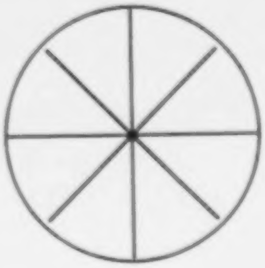
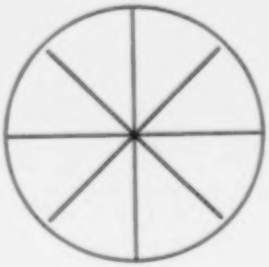
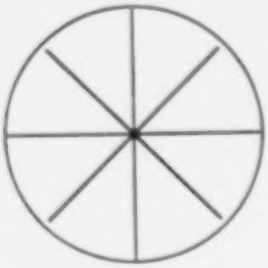
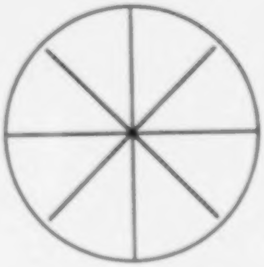
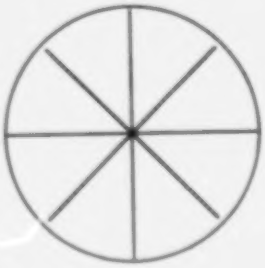
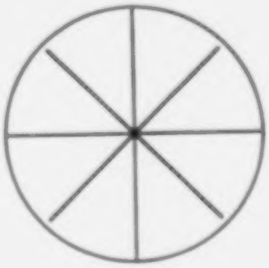
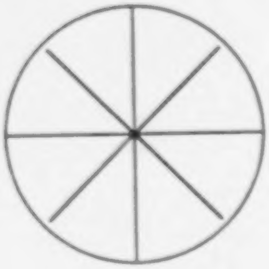
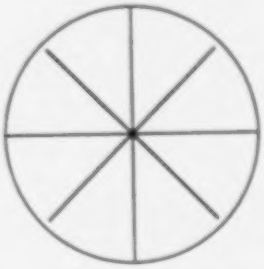
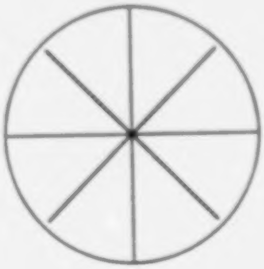
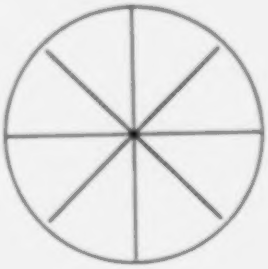
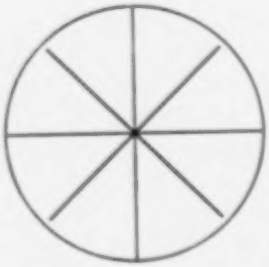
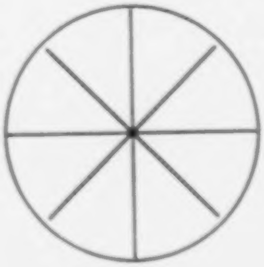
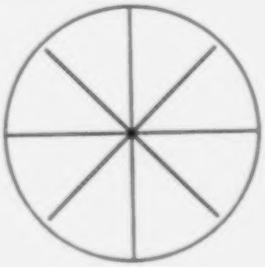
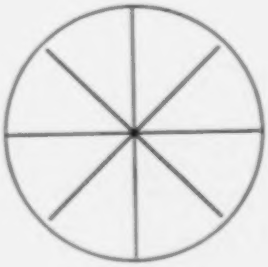
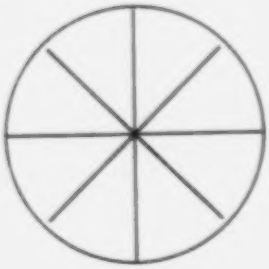
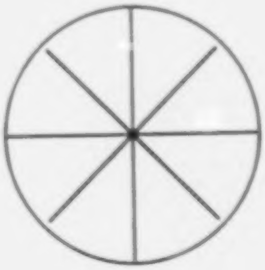
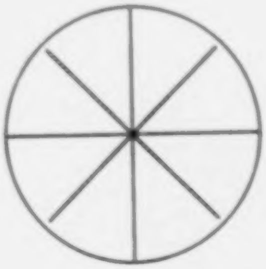
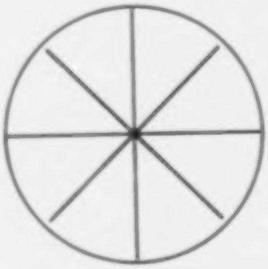






Circle Pattern Search

How many ways can you find to color the circles with one color and white? If you can turn or flip a colored circle to match another one, then it is considered the same coloring.

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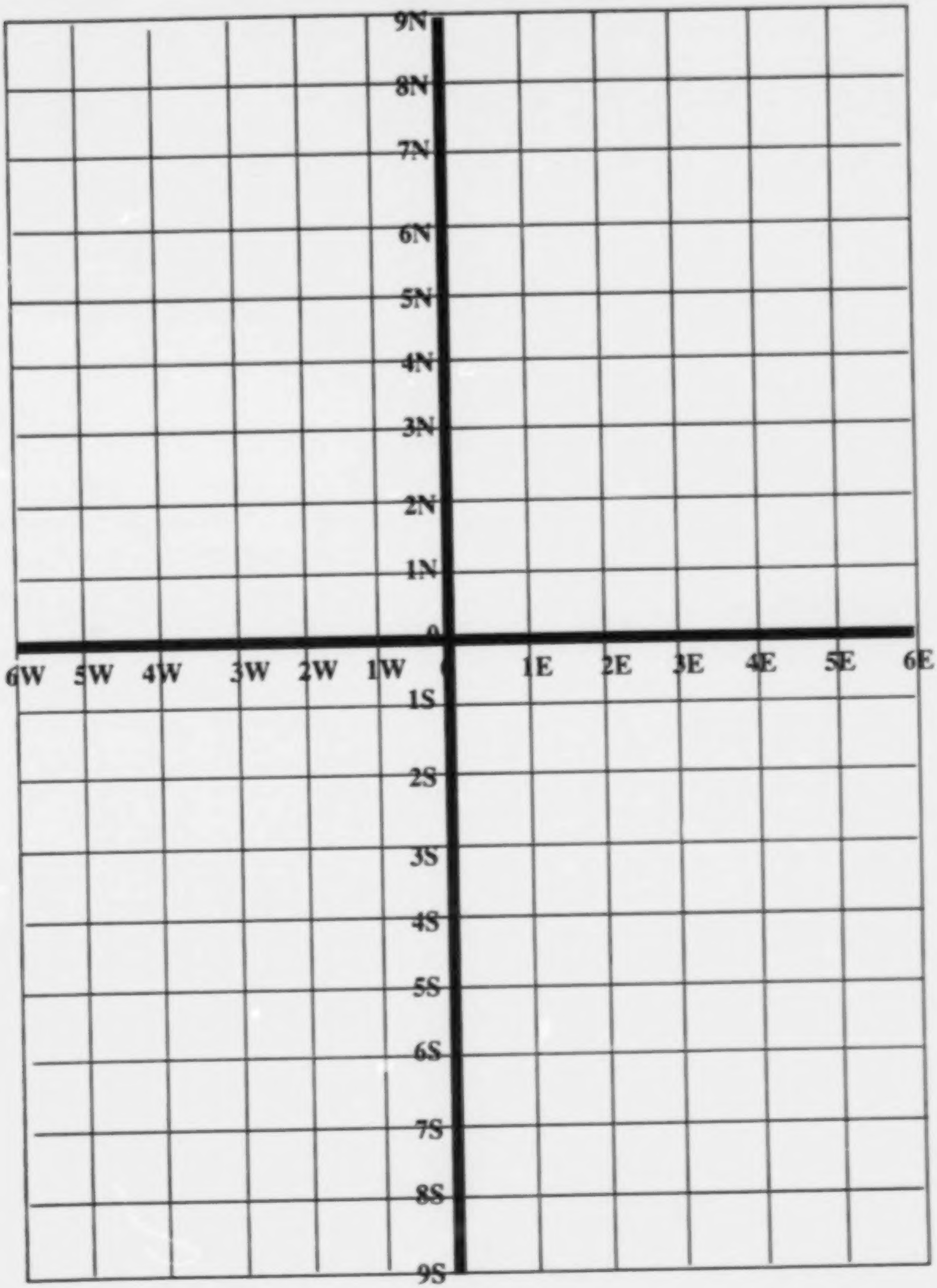
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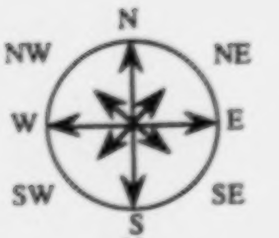
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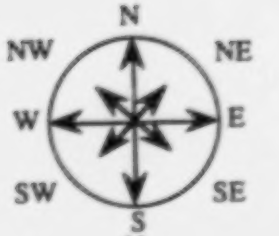
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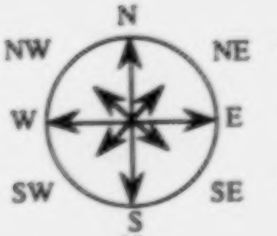
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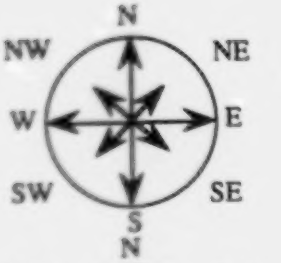
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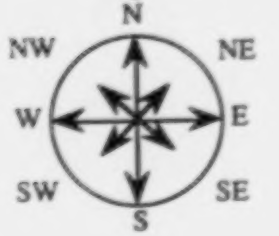
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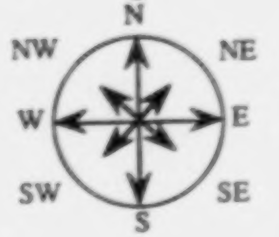
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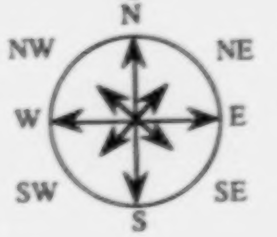
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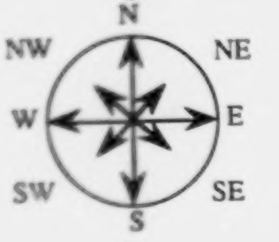
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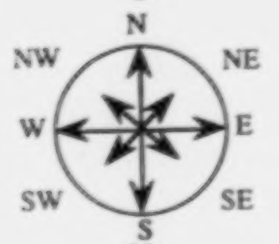
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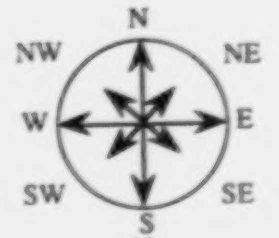
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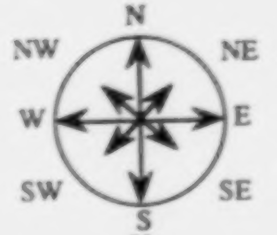
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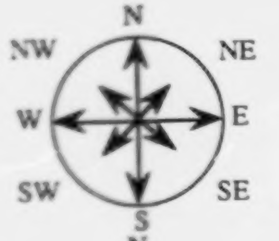
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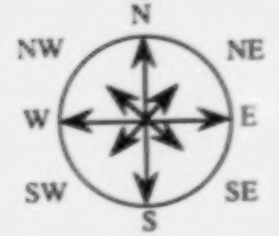
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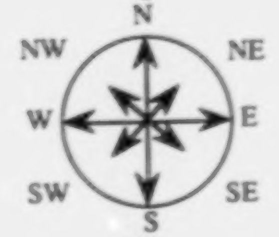
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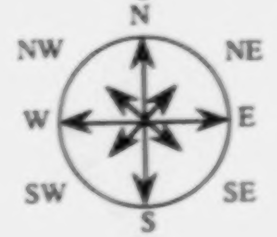
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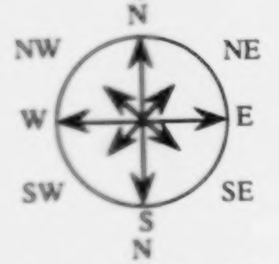
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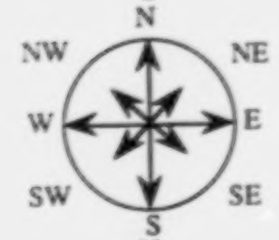
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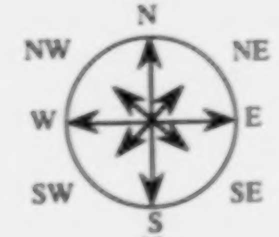
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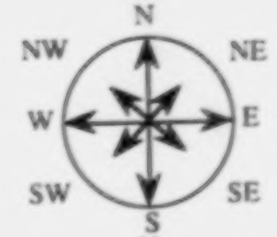
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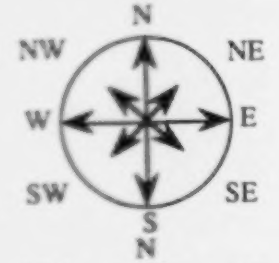
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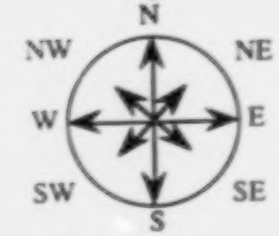
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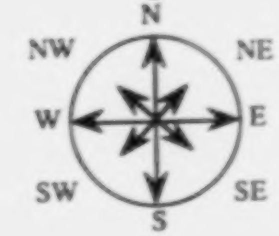
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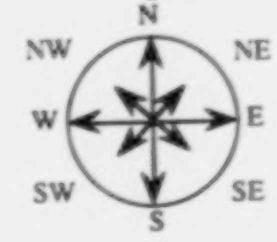
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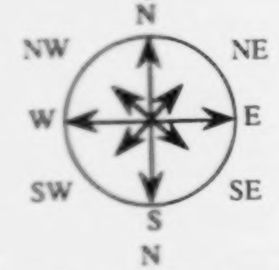
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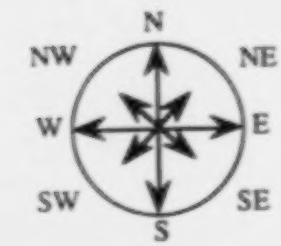
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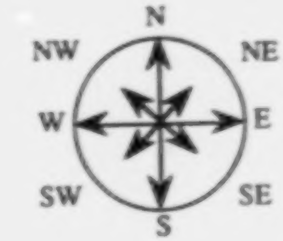
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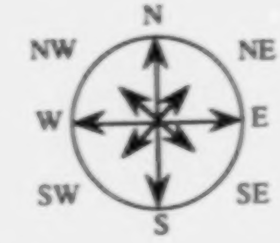
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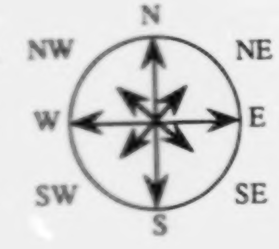
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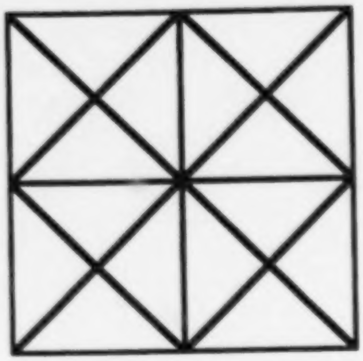

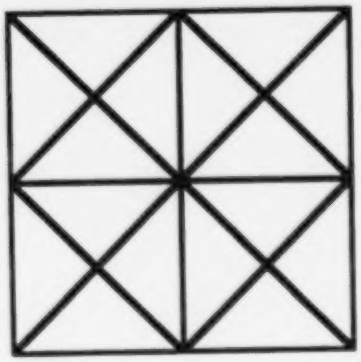

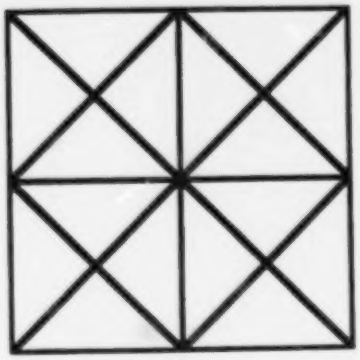

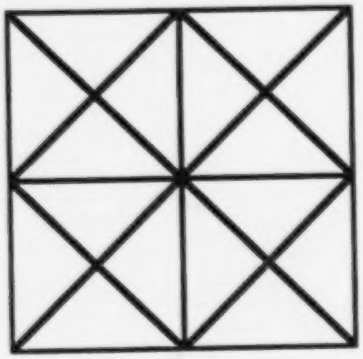

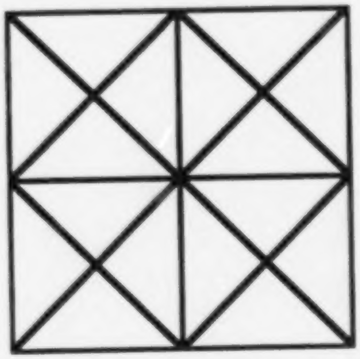

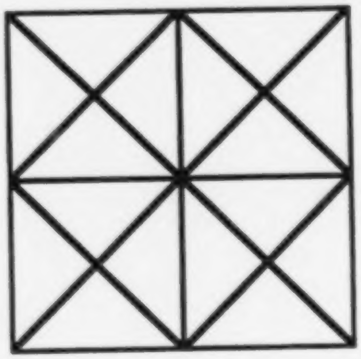

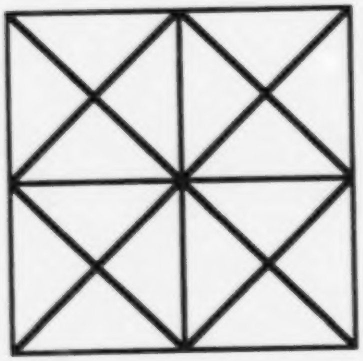

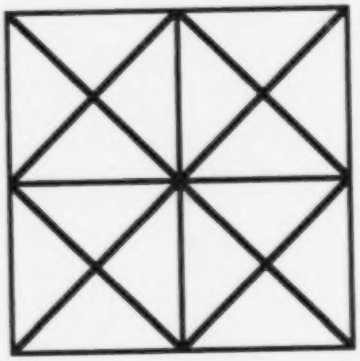

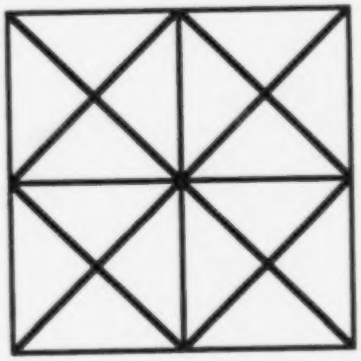

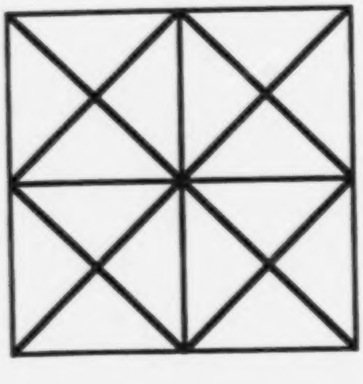

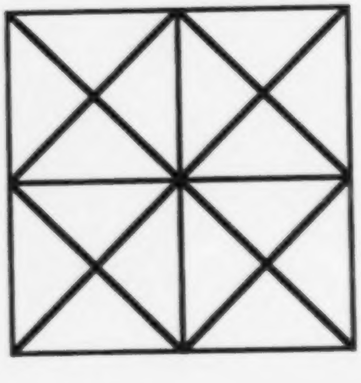

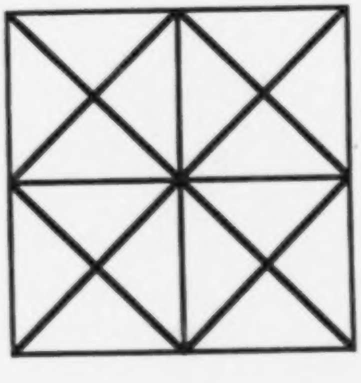

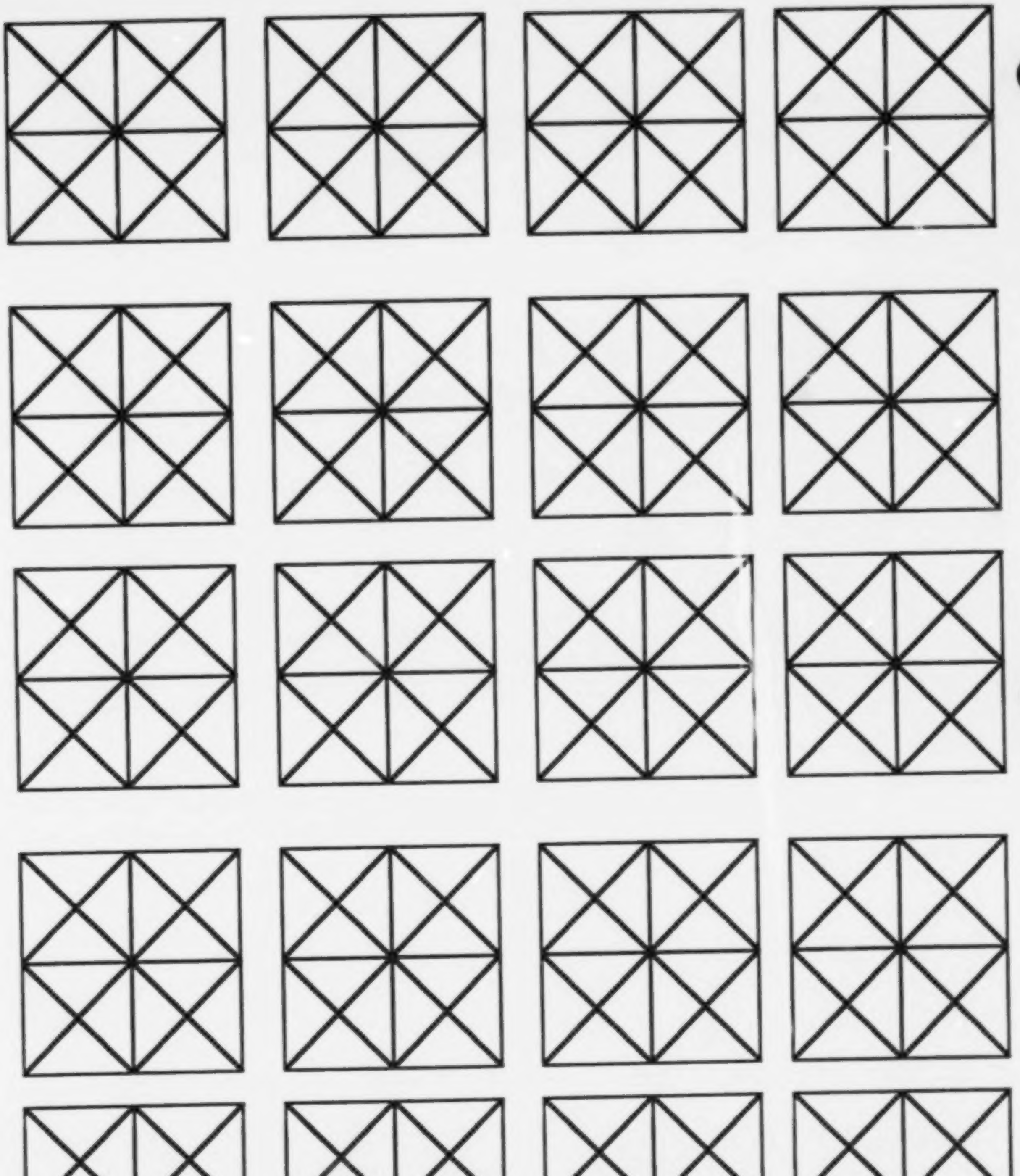

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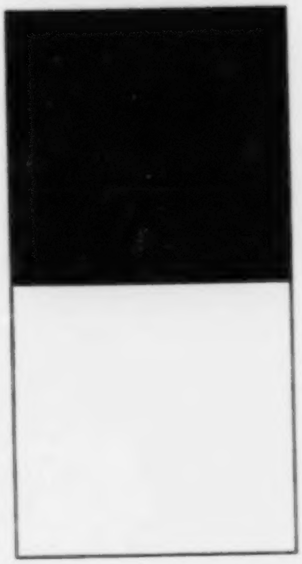
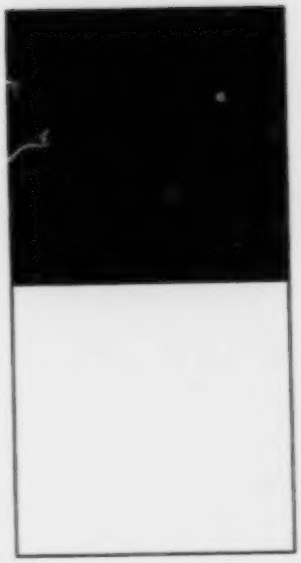
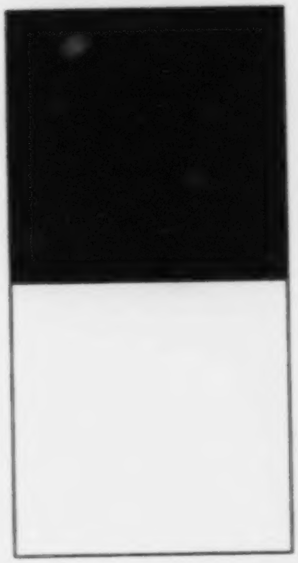






F31

What Do We Think?

Surveys conducted in your school, neighborhood or community help you find out what other people think about issues facing North Carolina.

1. Choose one news article that presents an issue facing your community or North Carolina.
2. Write a question for your survey. Your question should be able to be answered by a "yes", "no", or "undecided."
3. Conduct your survey. You may survey your classmates, teachers, or neighbors. Talk to about 25 people.
4. Record your information on the Record Chart below. (You might use the tally markers.)
5. Compute your totals. Create an interesting data display such as the *USA TODAY* SNAPSHOTS to illustrate the results.

Issue: ____

____

Question: ____

____

RECORD CHART

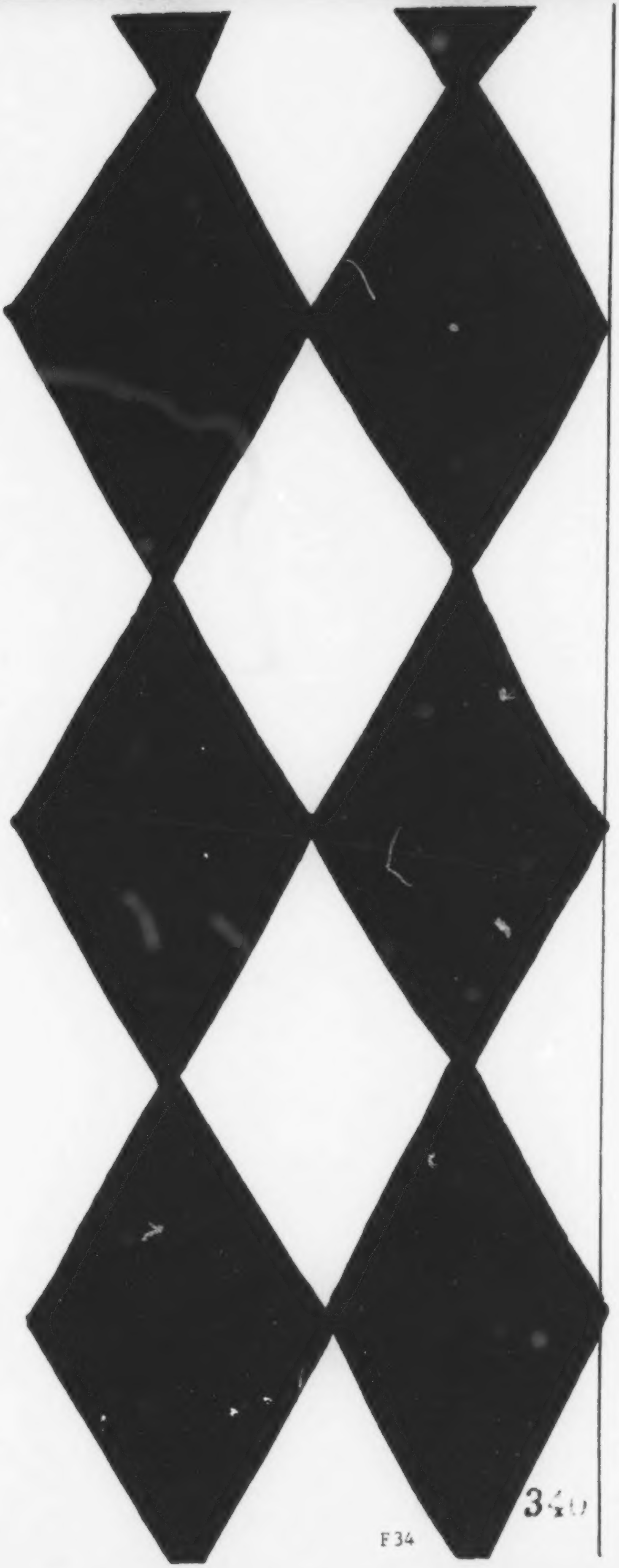
YES	NO	UNDECIDED
TOTAL	TOTAL	TOTAL

Interpretation: ____

____

____

____



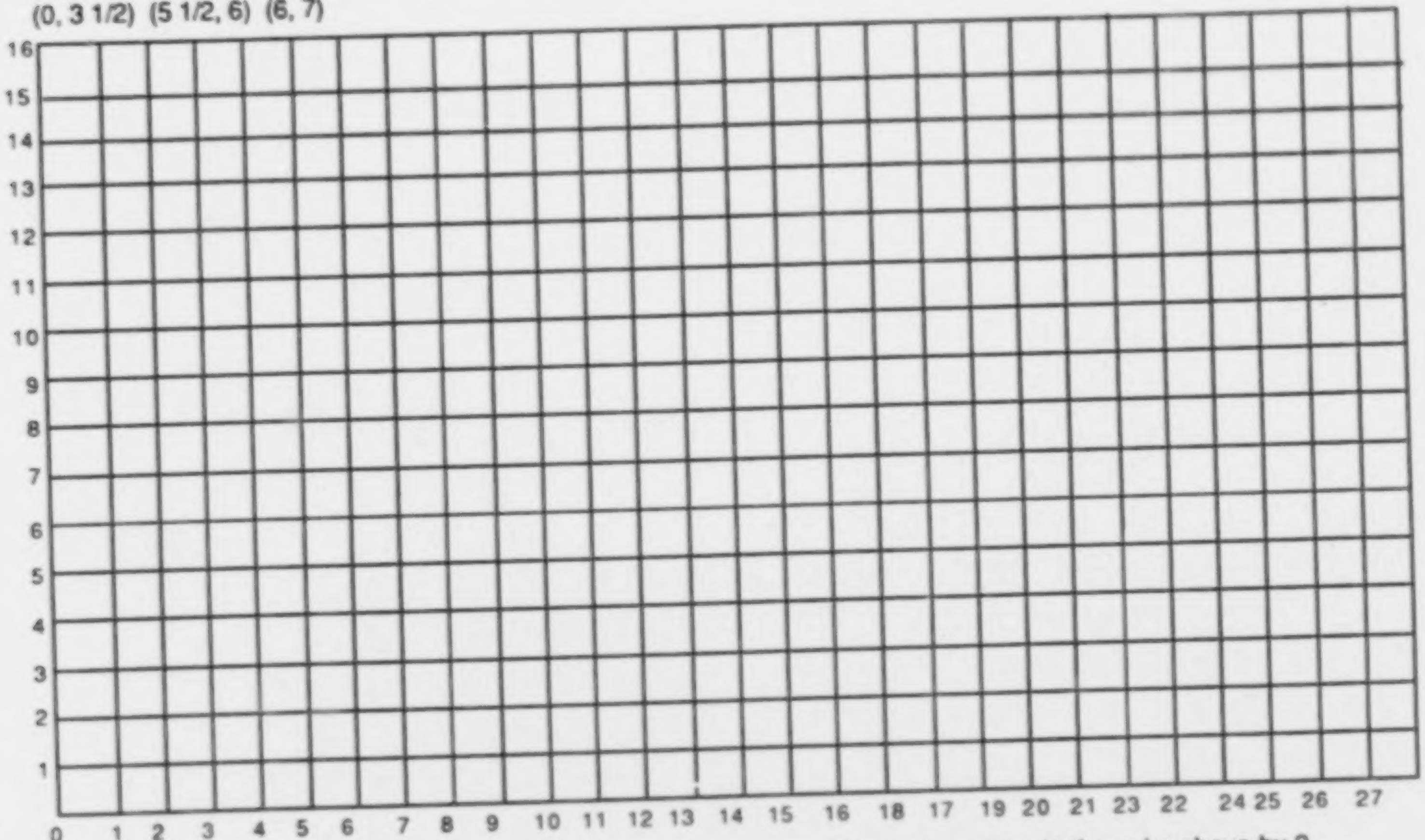
Directions:

1. Cut along the solid line.
2. Fold into a cylinder and tape
3. Use black Construction paper to create a top for the lighthouse.

Using Coordinates

A. Connect these points in order. What picture do you see?

(6,7) (17 1/2, 7) (18, 6) (18 1/2, 4) (16 1/2, 2) (15, 2) (14, 1) (12 1/2, 0) (8, 2 1/2) (8, 3) (5, 3 1/2) (4, 3) (0, 3) (0, 3 1/2) (5 1/2, 6) (6, 7)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7
8
9
10
11
12
13
14
15
16
18
17
19
20
21
23
22
24
25
26
27

B. Use your own graph paper to see what happens when you multiply each number in the pairs above by 2.

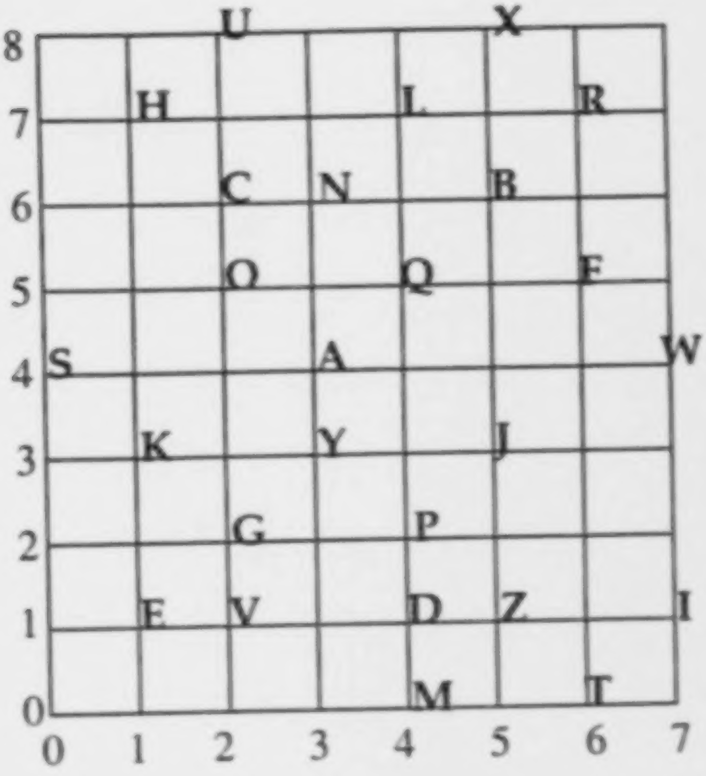
C. What happens when only the first numbers of the ordered pairs are multiplied by 2?

D. What happens when you double only the second numbers of the ordered pairs?

F35

Expressions of Appalachian Mountain Folk

1. Decode to find the word which is defined for you.



(1,7) (2,5) (4,7) (4,7) (1,1) (6,7)
A small valley

(2,2) (3,4) (3,6) (4,1) (1,1) (6,7)
To look at

(4,2) (2,5) (1,3) (1,1)
Paper bag

(1,3) (7,1) (2,1) (2,1) (1,1) (6,7)
Cover; a lid for a pot or a blanket

(0,4) (4,0) (3,4)(2,6) (1,3) – (4,1) (3,4) (5,6)
On the dot, exactly

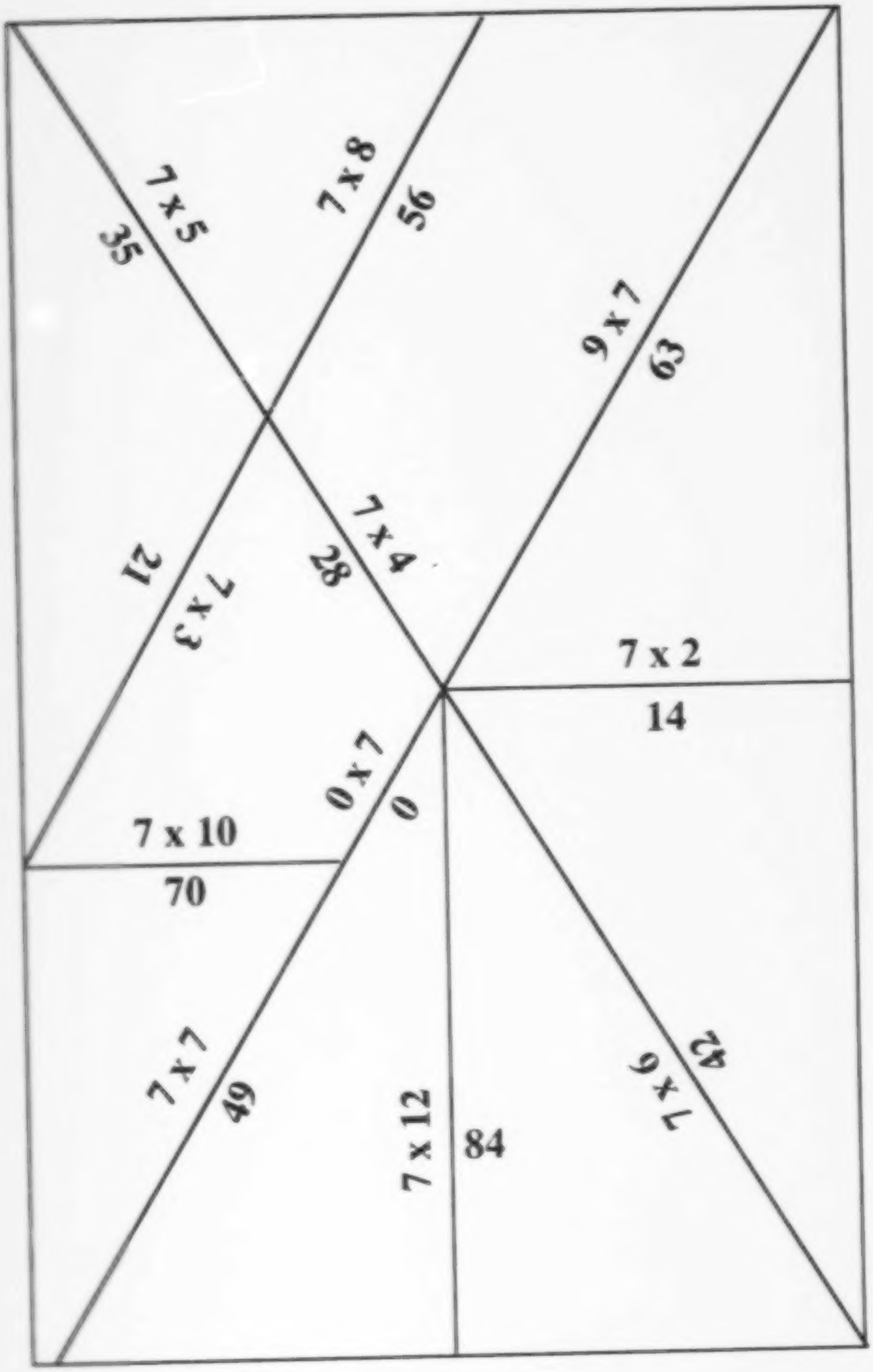
(2,1) (7,1) (6,0) (6,0) (4,7) (1,1) (0,4)
Food

(6,5) (2,8) (6,7) (4,2) (7,1) (1,1) (2,6) (1,1)
A great distance

(4,2) (2,8)(6,0) (2,5) (2,8) (6,0)
Angry or annoyed

2. Interview people in your neighborhood to find other expressions from different parts of the country. Write the definitions for those words on another sheet of paper and use this code to write the coordinates.

MULTIPLICATION PUZZLE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9 x 7
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7 x 4
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7 x 2
14
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0
7 x 10
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7 x 7
49
7 x 12
84
7 x 6
42

BONUS: NAME THE GEOMETRIC FIGURES IN THE PUZZLE.

Use this page to create other examples of number facts drills.

STUDENT CENSUS

Name ____
First Middle Last

Date of Birth ______________________ Age ______________
Month Day Year

Were you born in the United States? (Check one) ☐ Yes ☐ No

In North Carolina? ☐ Yes ☐ No In this county? ☐ Yes ☐ No

Place of Birth ____

Address ____

____
City State Zip Code

Number of people who live at this address ______________________

Telephone number ______________________

Number of brothers ______________ Number of sisters ______________

Hair color ______________ Eye color ______________

Check one: ☐ Right-handed ☐ Left-handed

Circle the grades attended at this school: K 1 2 3 4

How do you usually come to school? (Check one)

☐ car ☐ bus ☐ walk ☐ bicycle ☐ other ______________

Circle your favorite subject:

Reading Mathematics Science Social Studies

What is your favorite activity? (Circle one)

Playing Watching TV Reading Other ______________

TANGRAM TALLY

Which shapes can you make with one set of tangram pieces? Sketch in each square the ones that you are able to do. What can you say about the relationships the pieces to each other?

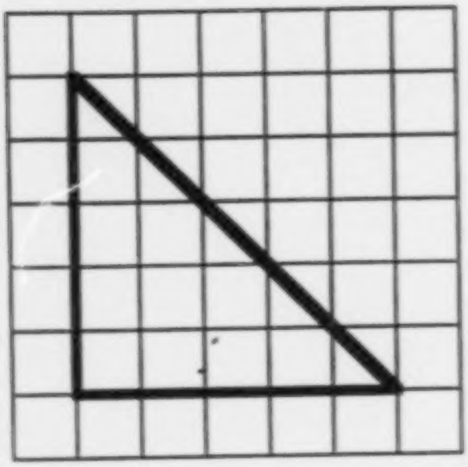
Try to make all of these shapes and fill in the grid

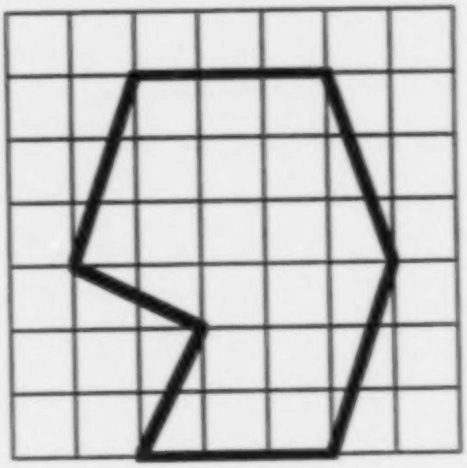
Can you make the shapes with this many pieces?

	1	2	3	4	5	6	7
square							
rectangle							
triangle							
trapezoid							
parallelogram							
pentagon							
rhombus							

Using Clear Mathematical Vocabulary

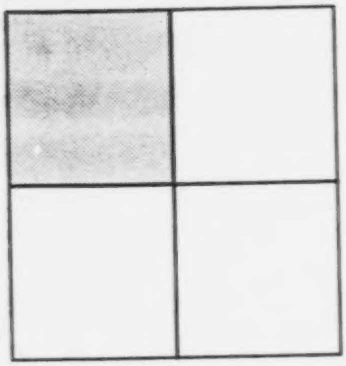
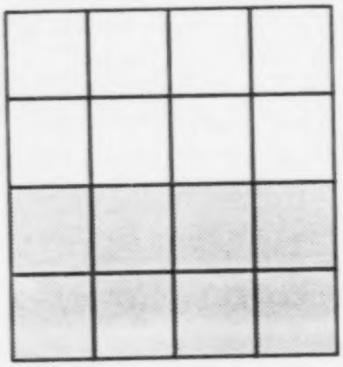
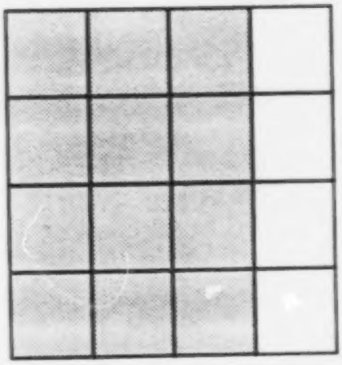
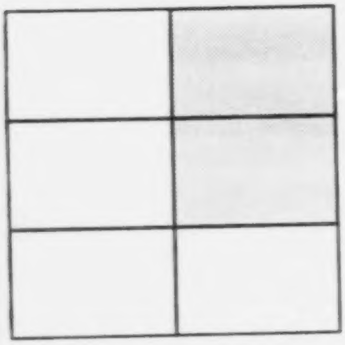
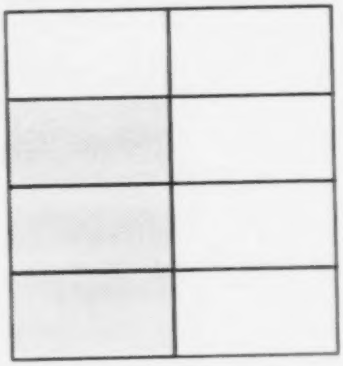
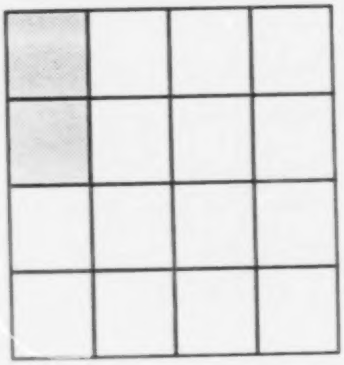
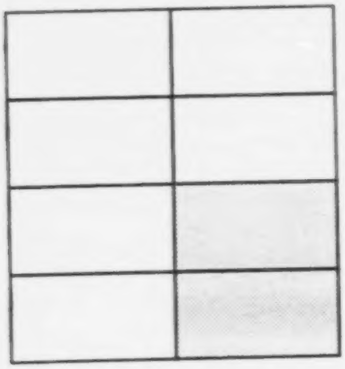
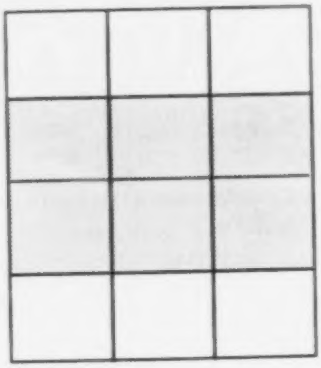
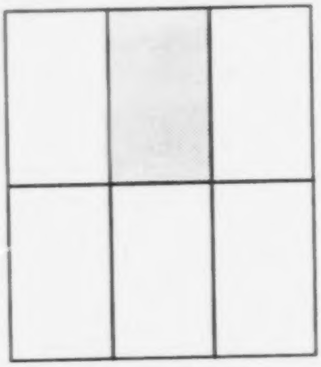
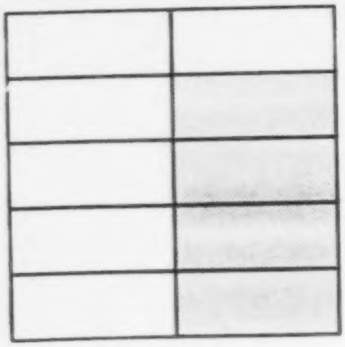
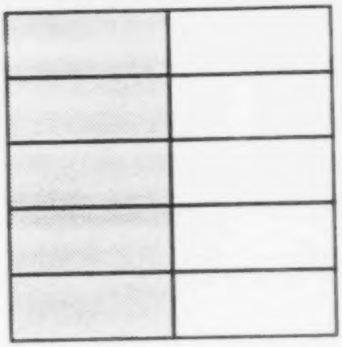
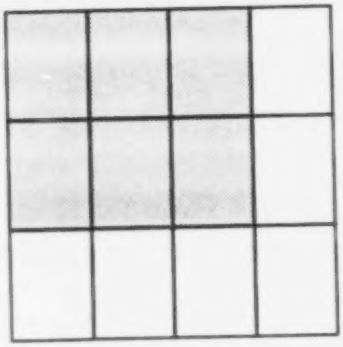
Suppose you are talking on the telephone and doing your homework with a friend. You are trying to describe how to make these exact figures. Write a set of directions for each figure to tell what you would say to the friend.





Make two new designs and write a set of directions. Try having a friend draw your design as you read your directions.

Fraction Tic-Tac-Toe

PAPER BAG FRACTION BAR GAMES

BINGO - 4

1. Each student needs a game board such as the one to the left and at least 20 markers. The same brown bag is shared by all players.
2. Place one set of fraction bars into the bag. Each student takes a turn drawing a fraction bar from the bag and marking one answer on his game board. After each turn, return the bar to the bag.
3. The winner is the first student to cover 4 in a row.
4. Variation: Allow students to cover equivalent fractions.

$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{3}{6}$
$\frac{1}{2}$	$\frac{5}{12}$	$\frac{1}{3}$	$\frac{2}{4}$	$\frac{2}{6}$
$\frac{4}{4}$	$\frac{0}{3}$	$\frac{4}{6}$	$\frac{3}{3}$	$\frac{3}{12}$
$\frac{10}{12}$	$\frac{2}{2}$	$\frac{8}{12}$	$\frac{5}{6}$	$\frac{4}{12}$
$\frac{7}{12}$	$\frac{0}{2}$	$\frac{9}{12}$	$\frac{1}{6}$	$\frac{11}{12}$

PREDICT IT

1. The leader draws a fraction bar from the bag and places it on the table.
2. Students predict whether the bar they will draw from the bag will be equivalent to, less than or greater than the area shaded on this one.
3. When students draw their bars, they get 1 point for naming the bar correctly and an additional 2 points if they predicted correctly.
4. After each round the leader places a new bar in the center for the comparison. The winner is the first student to earn 25 points.

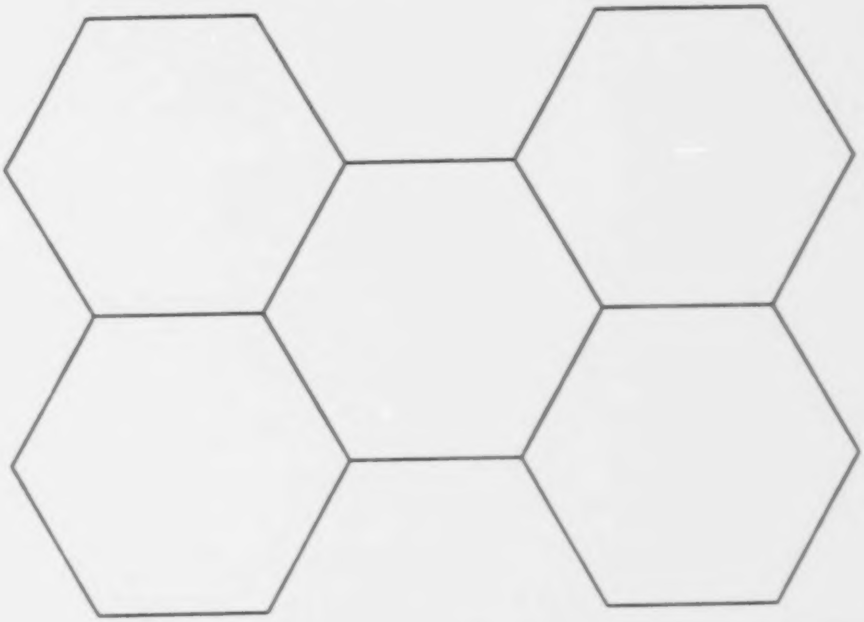
TRADE IN

1. The object of the game is to be the first player to have the bars arranged in order from greatest to least area shaded by trading bars not rearranging them.
2. Each student draws 4 bars from the bag. The bars must be placed on the table in the order in which they are drawn.
3. The first player draws a fifth bar from the bag. He may replace one of his bars or keep his original four bars. He then passes one bar to the next student. The second student may trade it for one of his bars or pass the same bar along. The round is completed when all players have had an opportunity to trade one bar. The extra piece is discarded at the end of the round.
4. Other rounds are played the same way except that the students take turns drawing the bar from the bag.
5. The game ends when 1 student has 4 bars in order from greatest to least.

GIVE AWAY

1. Each student is dealt 6 fraction bars. The leader draws 1 bar from the bag. Students may give away all bars equivalent to the one drawn by naming the fractions involved and demonstrating the equivalences.
2. The winner is the first student to give away all of his bars.

FRACTION ACTION



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____________________ 19 ____

Pay to the order of ______________________________ $ ☐

____ DOLLARS

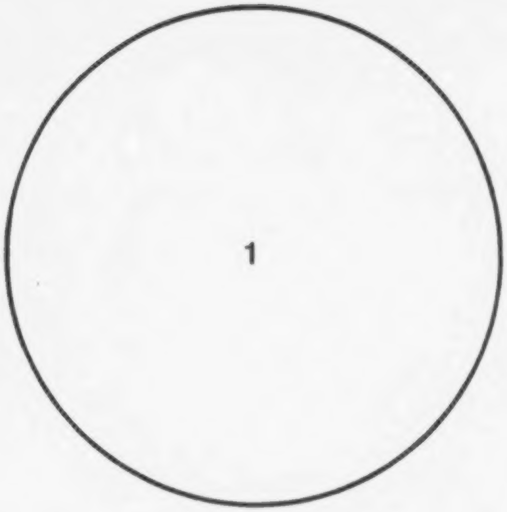
SchoolsBank
of North Carolina

For ____________________ ____________________

Dollar Derby

Challenge: What are the rules you need to play this game in reverse (start with one dollar and give it all away)?

Directions: Take turns rolling a die. Collect that many pennies. As soon as you can, trade 10 pennies for a dime. The winner is the first to be able to trade 10 dimes for a dollar. At each turn players must write the value of money on their boards in decimal form.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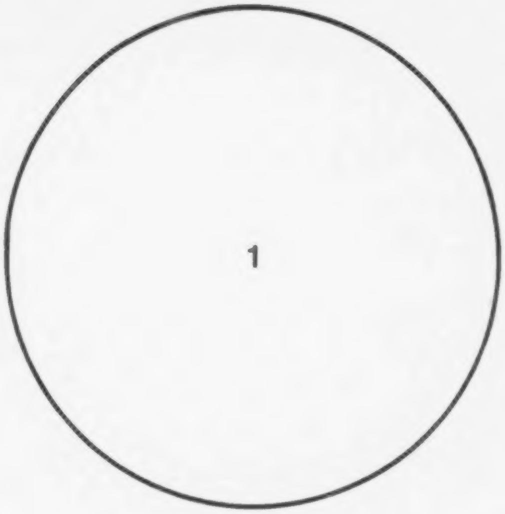
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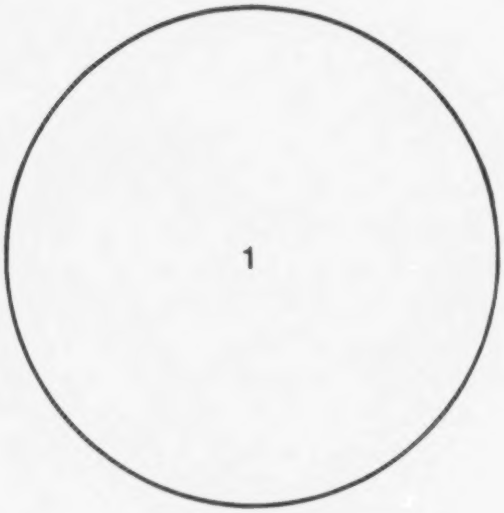
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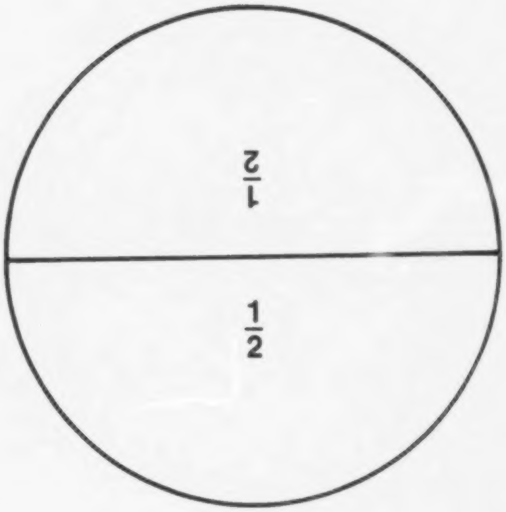
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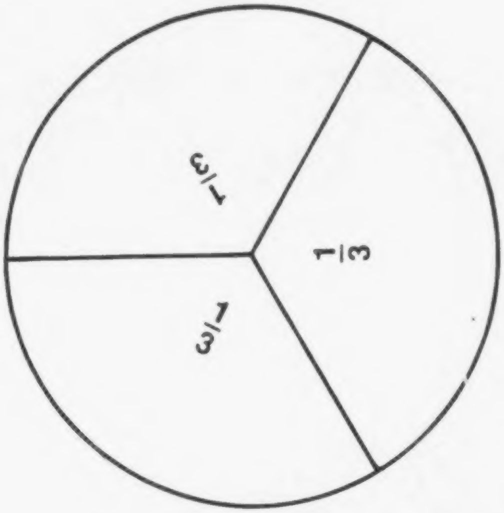
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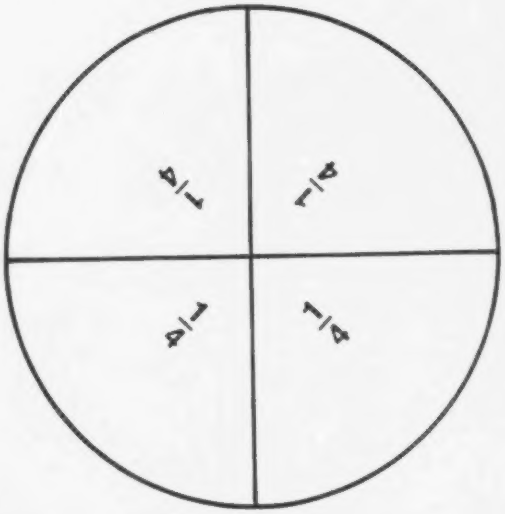
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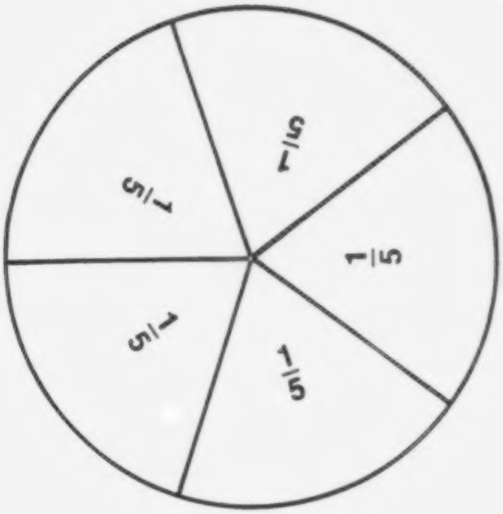
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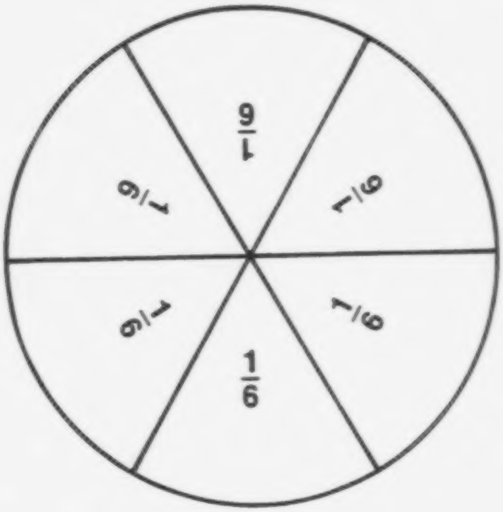
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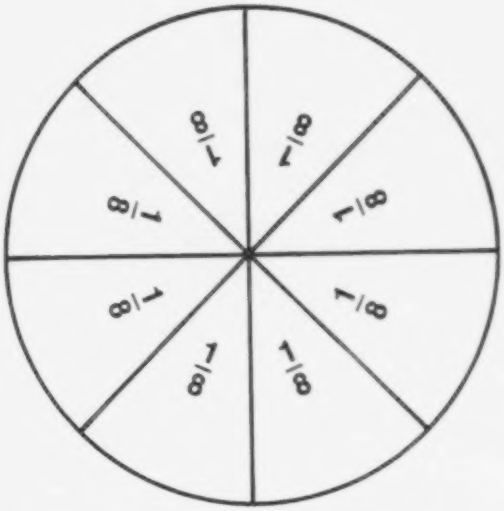
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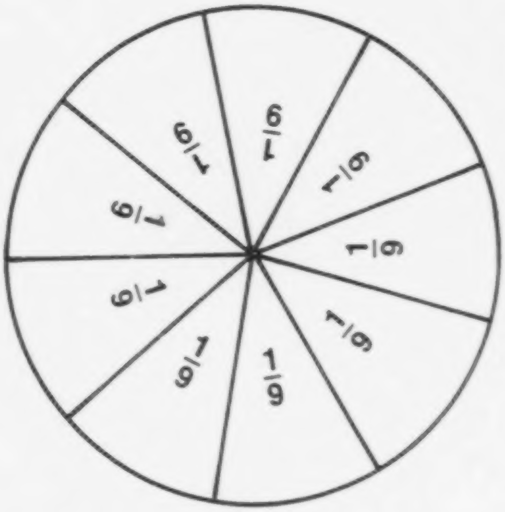
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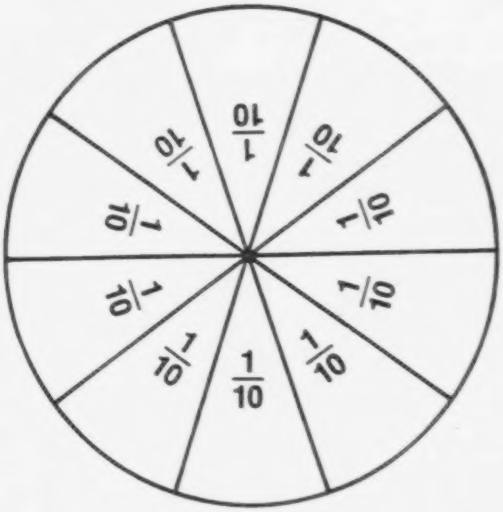
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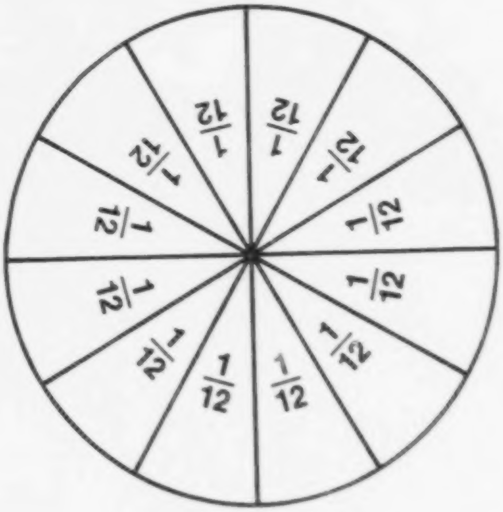
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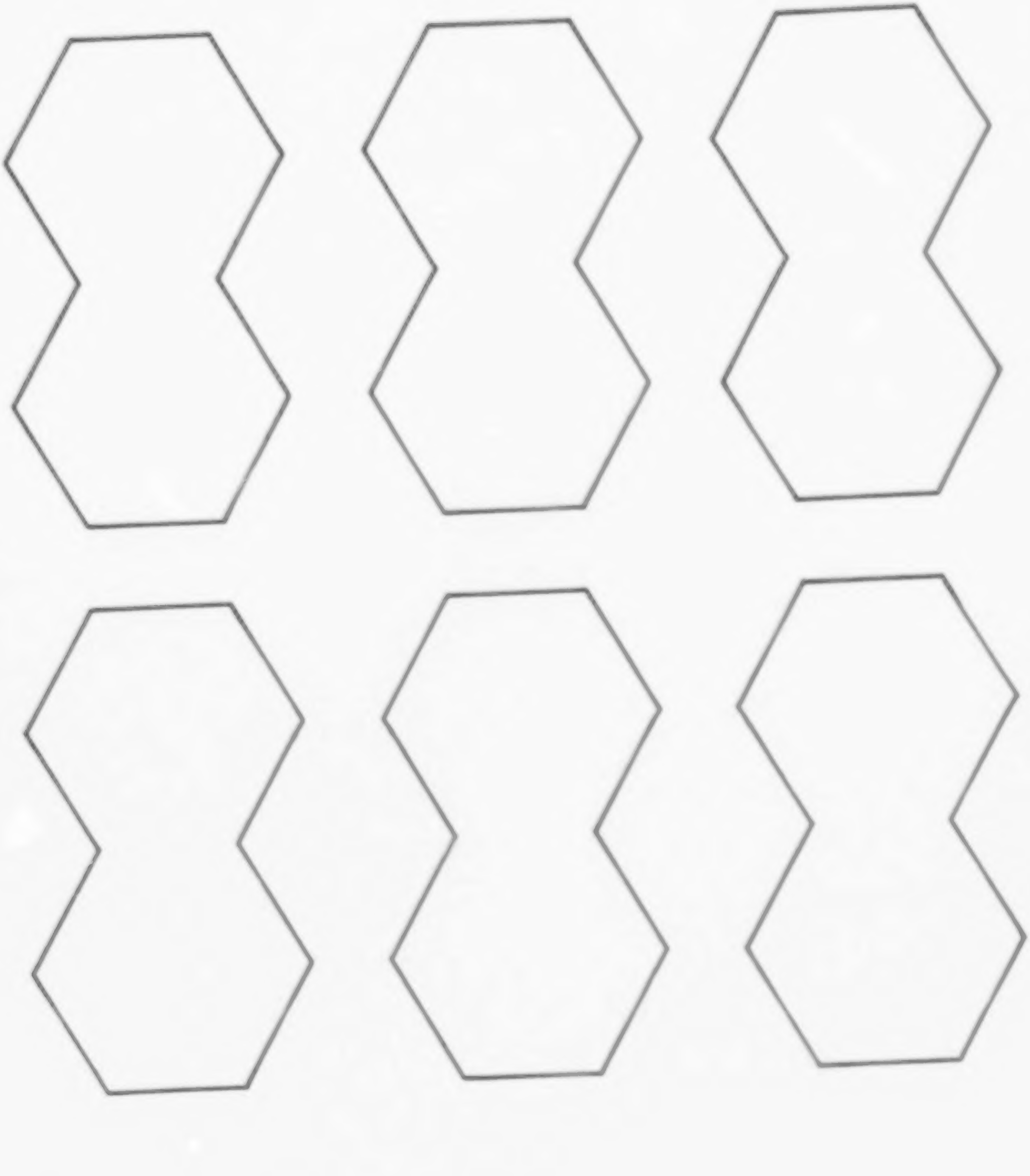
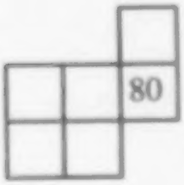
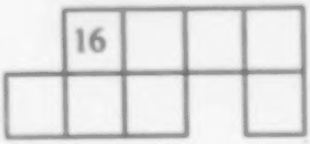
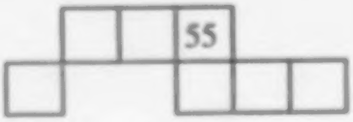


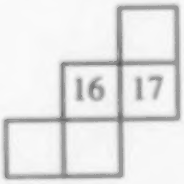
DO YOU KNOW YOUR WAY AROUND A HUNDREDS BOARD?

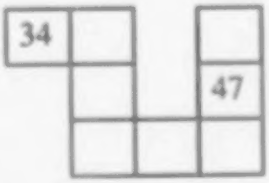
A. A standard 1 to 100 board has been cut apart. Fill in the missing numbers.

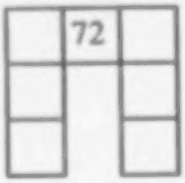




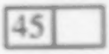








B. Work your way around 45 by filling in the boxes and describing the relationships of the numbers you fill in up to 45.



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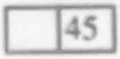

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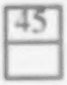

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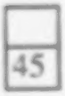

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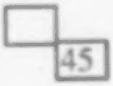

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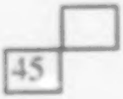

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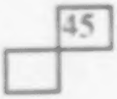

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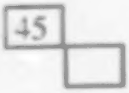

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C. Suppose you spilled hot chocolate on the number 45 in any one of the boxes. Could you describe the relationships in a way that would be true for any number?

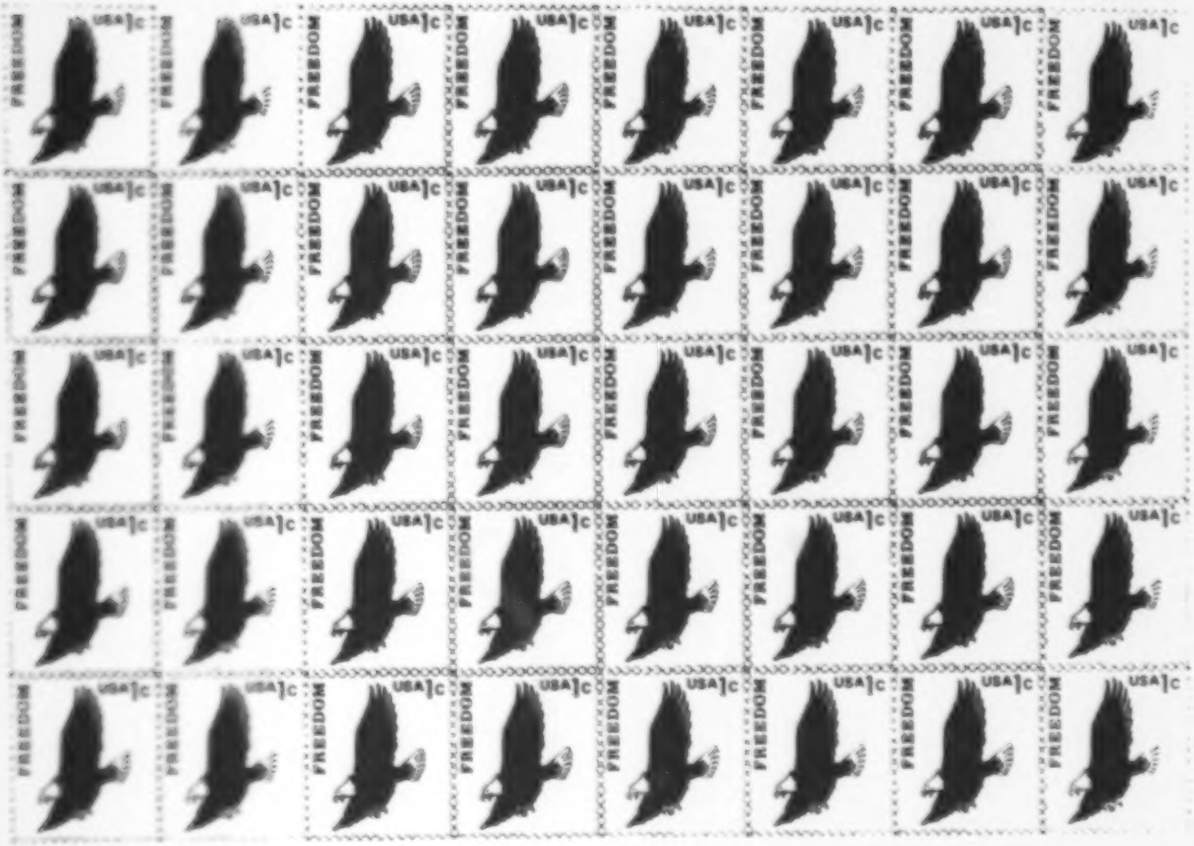
License Plate Game

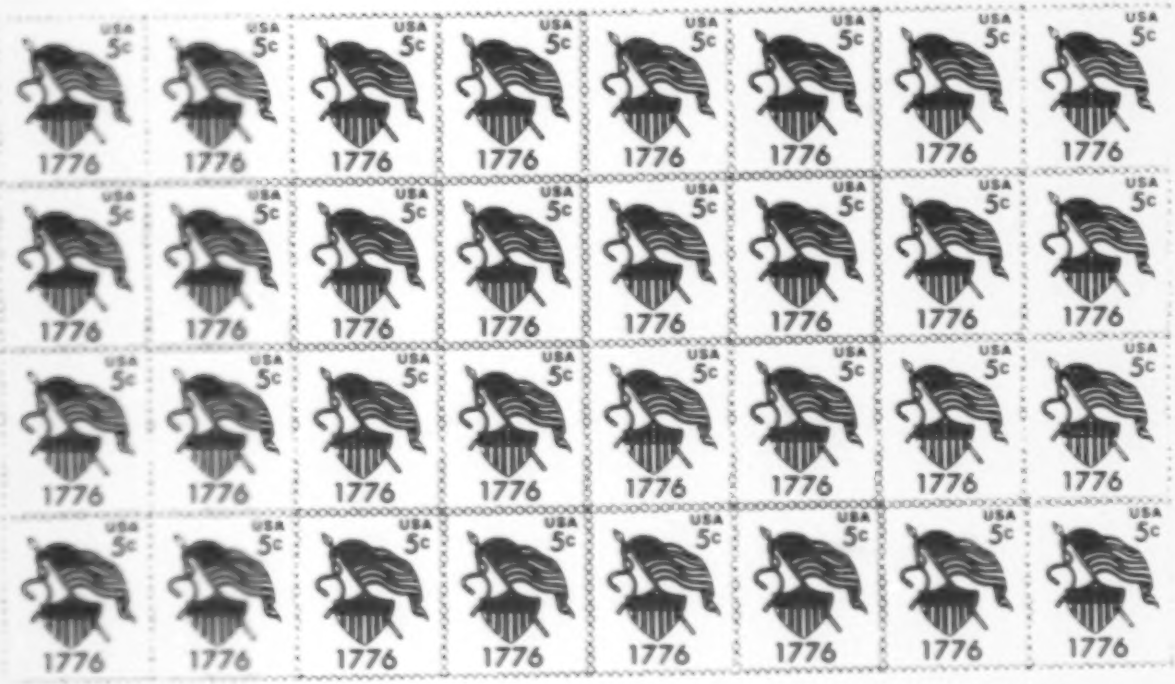
Materials - Duplicate two copies of the license plate master per student. Have each student write a different 3-digit number on the left side of each plate. Students exchange papers and write different 3-digit numbers on the right side of the licenses. Cut license plates apart and store in envelopes or sandwich bags in sets of 60.

To play: Three or four students use one set of license plates. All students draw a license and place it face down. At the word "go" students turn over their licenses and add mentally the six digits. For example, 6 + 2 + 4 + 1 + 6 + 5 = 24. Continue to add digits until a single digit answer results. 2 + 4 = 6. If the final single digit appears on the original license, the player earns two points. If the final digit is not on the license, the player's score is 0. Continue until all plates are used.

DUPLICATE TWO PER STUDENT ON HEAVY PAPER.

NC 89	NC 93
NC 90	NC 94
NC 91	NC 95
NC 92	NC 96


FREEDOM
USA 1c



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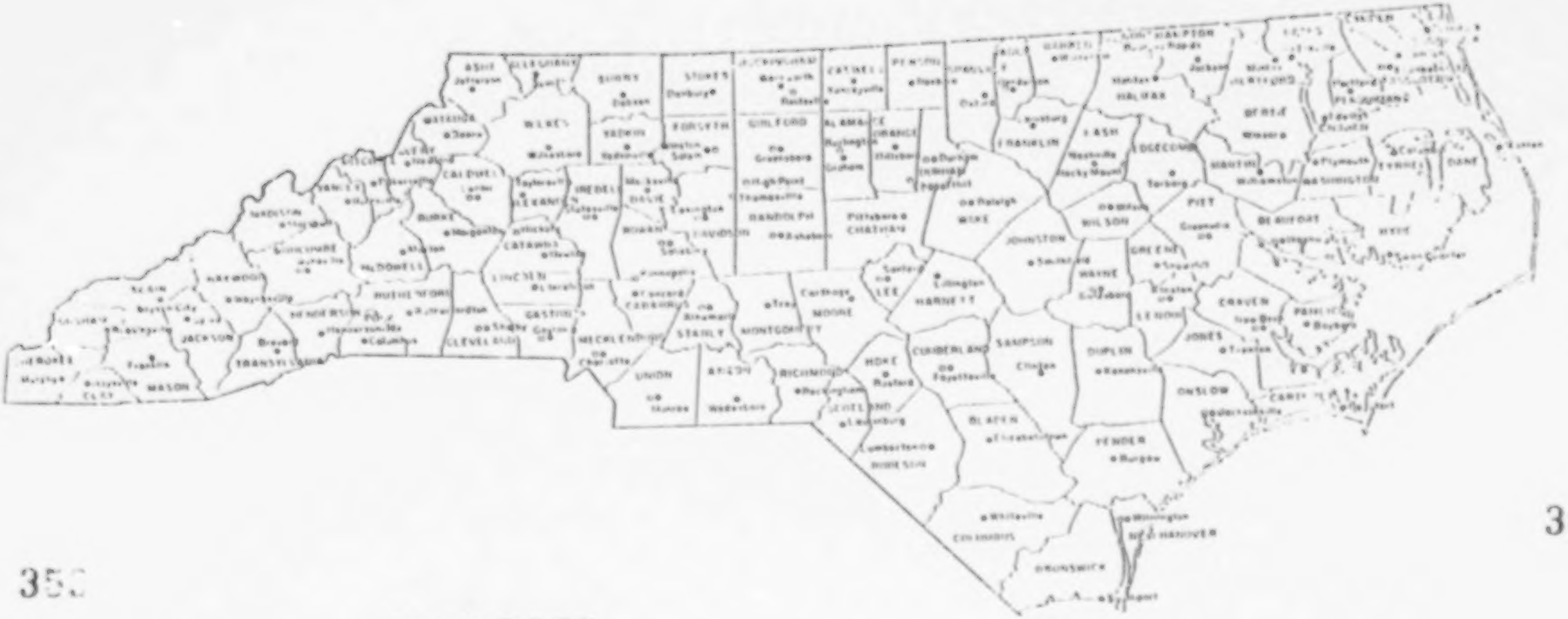
SCALE IN MILES

KNOW
NORTH CAROLINA
COUNTY SEATS

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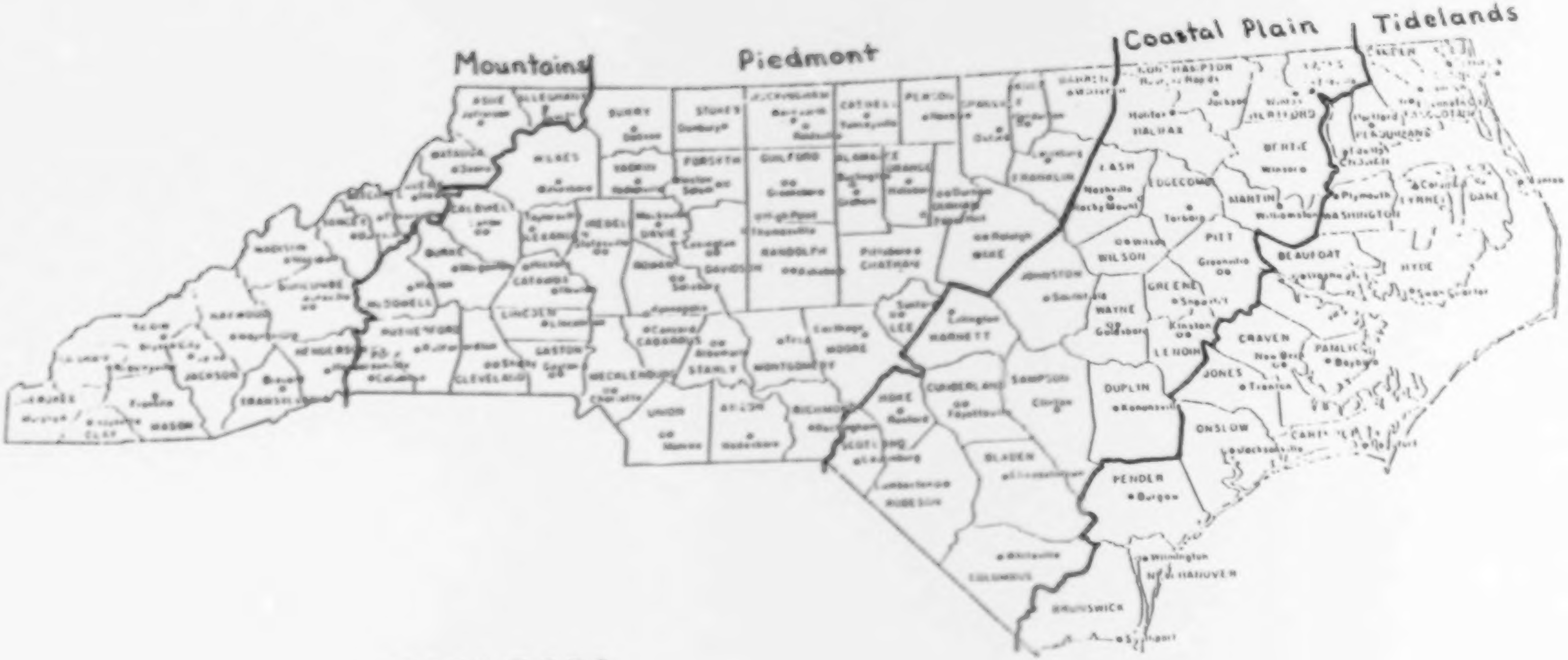
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Piedmont
Coastal Plain
Tidelands
ASHE
Jefferson
WILKES
WATAUGA
Boone
CALDWELL
Lenoir
BURKE
Morganton
McDOWELL
Marion
BUNCOMBE
Asheville
MADISON
HAYWOOD
Waynesville
JACKSON
TRANSYLVANIA
Brevard
HENDERSON
RUTHERFORD
Rutherfordton
POLK
Columbus
CLEVELAND
Shelby
GASTON
Gastonia
LINCOLN
Lincolnton
CATAWBA
MACON
Franklin
CLAY
CHEROKEE
Murphy
SURRY
Dobson
STOKES
Danbury
YADKIN
FORSYTH
Winston Salem
ROCKINGHAM
Wentworth
Reidsville
CASWELL
Yanceyville
PERSON
Roxboro
GRANVILLE
Oxford
GUILFORD
Greensboro
High Point
ALAMANCE
Graham
ORANGE
Hillsboro
Durham
IREDELL
Statesville
DAVIE
Mocksville
DAVIDSON
Lexington
Thomasville
RANDOLPH
Asheboro
CHATHAM
Pittsboro
WAKE
Raleigh
FRANKLIN
Louisburg
WARREN
Warrenton
NASH
Nashville
Rocky Mount
JOHNSTON
Smithfield
WILSON
Wilson
WAYNE
Goldsboro
HARNETT
Lillington
LEE
Sanford
MOORE
Carthage
MONTGOMERY
Troy
STANLY
Albemarle
CABARRUS
Concord
MECKLENBURG
Charlotte
UNION
Monroe
ANSON
Wadesboro
RICHMOND
Rockingham
SCOTLAND
Laurinburg
HOKE
Raeford
CUMBERLAND
Fayetteville
SAMPSON
Clinton
ROBESON
Lumberton
BLADEN
Elizabethtown
COLUMBUS
Whiteville
BRUNSWICK
Southport
NEW HANOVER
Wilmington
PENDER
Burgaw
DUPLIN
Kenansville
ONSLOW
Jacksonville
JONES
Trenton
LENOIR
Kinston
GREENE
Snow Hill
CRAVEN
New Bern
PAMLICO
Bayboro
CARTERET
Beaufort
PITT
Greenville
BEAUFORT
Washington
EDGECOMBE
Tarboro
HALIFAX
Halifax
NORTHAMPTON
Jackson
HERTFORD
Winton
BERTIE
Windsor
MARTIN
Williamston
WASHINGTON
Plymouth
TYRRELL
Columbia
HYDE
Swan Quarter
DARE
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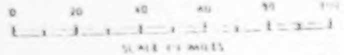
CHOWAN
Edenton
PERQUIMANS
Hertford
PASQUOTANK
CURRITUCK

KNOW NORTH CAROLINA COUNTY SEATS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SCALE IN MILES

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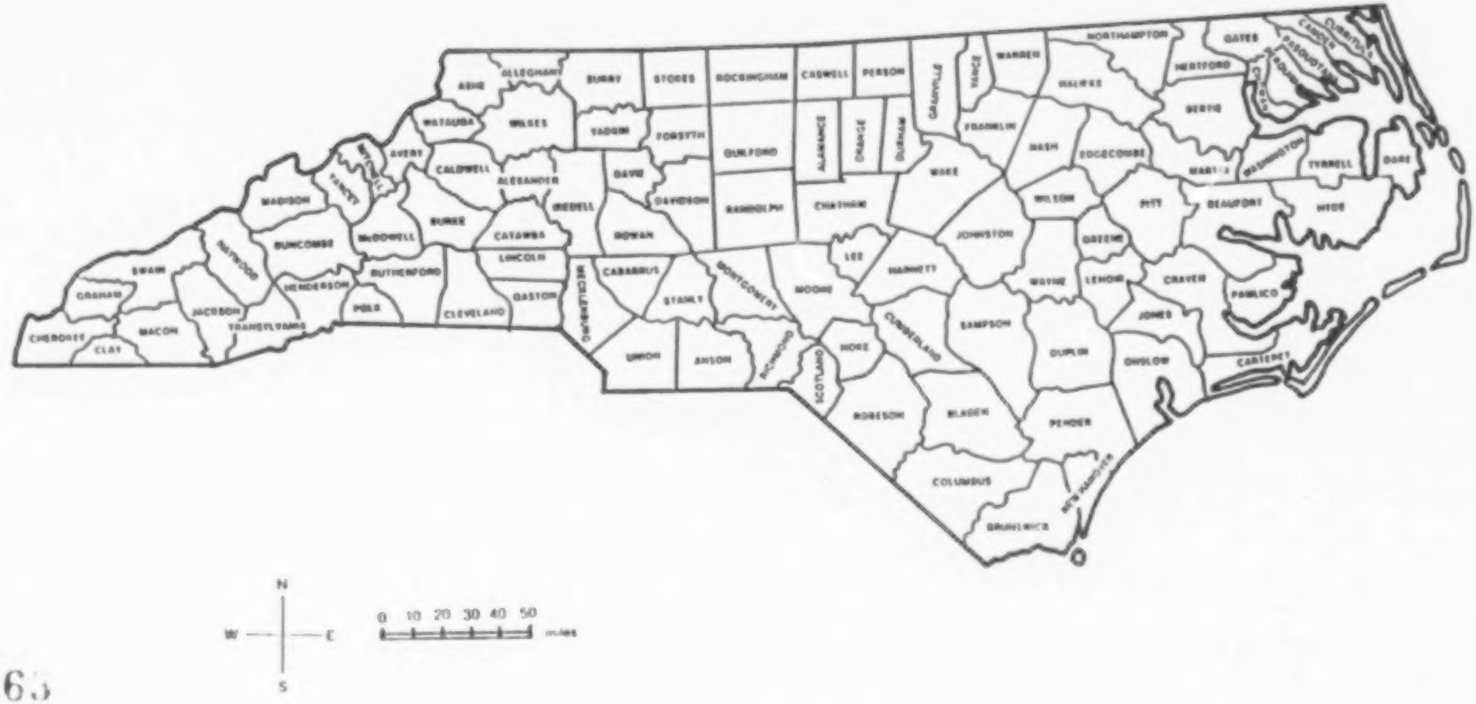
Counties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GATES
CAMDEN
CURRITUCK
PASQUOTANK
PERQUIMANS
CHOWAN
HERTFORD
HALIFAX
BERTIE
WATAUGA
WILKES
YADKIN
FORSYTH
GUILFORD
ALAMANCE
ORANGE
DURHAM
FRANKLIN
NASH
EDGECOMBE
MARTIN
WASHINGTON
TYRRELL
DARE
MITCHELL
AVERY
CALDWELL
ALEXANDER
DAVIE
DAVIDSON
RANDOLPH
CHATHAM
WAKE
WILSON
PITT
BEAUFORT
HYDE
MADISON
YANCEY
BURKE
IREDELL
ROWAN
JOHNSTON
GREENE
BUNCOMBE
McDOWELL
CATAWBA
LINCOLN
LEE
HARNETT
WAYNE
LENOIR
CRAVEN
PAMLICO
HAYWOOD
SWAIN
GRAHAM
CHEROKEE
CLAY
MACON
JACKSON
TRANSYLVANIA
HENDERSON
RUTHERFORD
POLK
CLEVELAND
GASTON
MECKLENBURG
CABARRUS
STANLY
MONTGOMERY
MOORE
CUMBERLAND
SAMPSON
DUPLIN
JONES
ONSLOW
CARTERET
UNION
ANSON
RICHMOND
SCOTLAND
HOKE
ROBESON
BLADEN
PENDER
COLUMBUS
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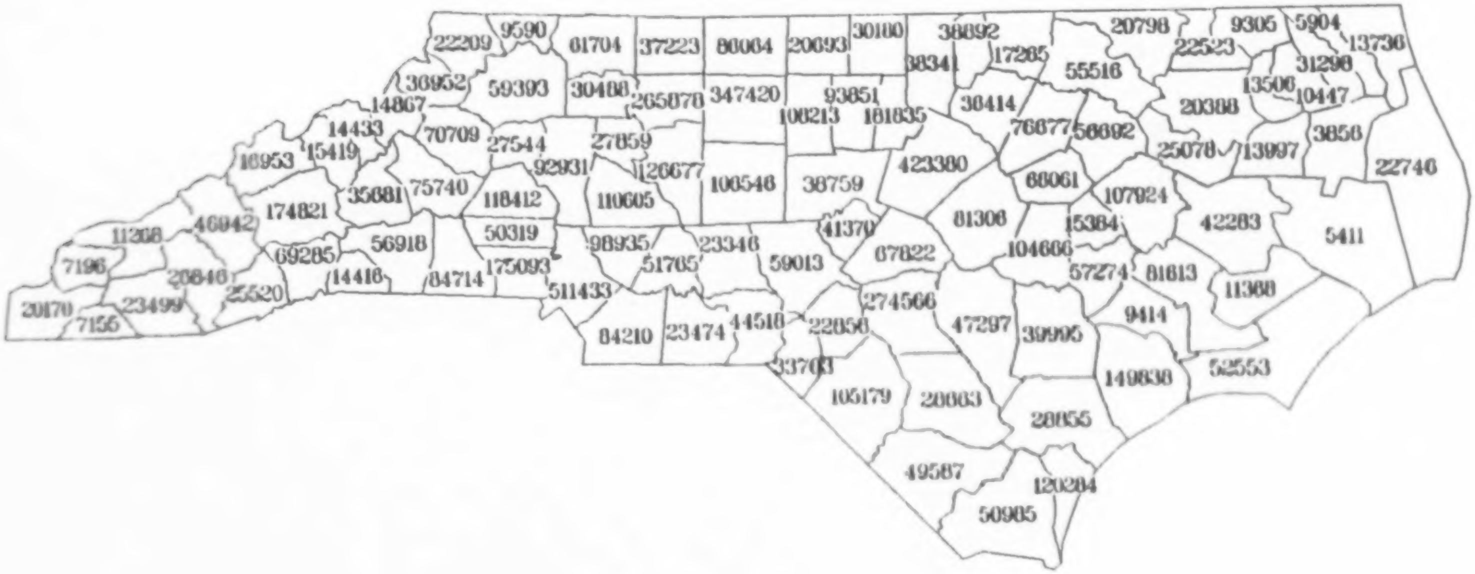
NORTH CAROLINA COUNTIES

1990 Census Population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59393
30488
265878
347420
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55516
31298
13506
10447
14867
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36414
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27544
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76677
56692
3856
16953
15419
92931
25078
13997
126677
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38759
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22746
174821
35681
75740
118412
110605
66061
107924
46942
11268
41370
81306
15384
42283
5411
50319
98935
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84210
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44518
22856
47297
39995
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Includes revised counts as of 6/9/92

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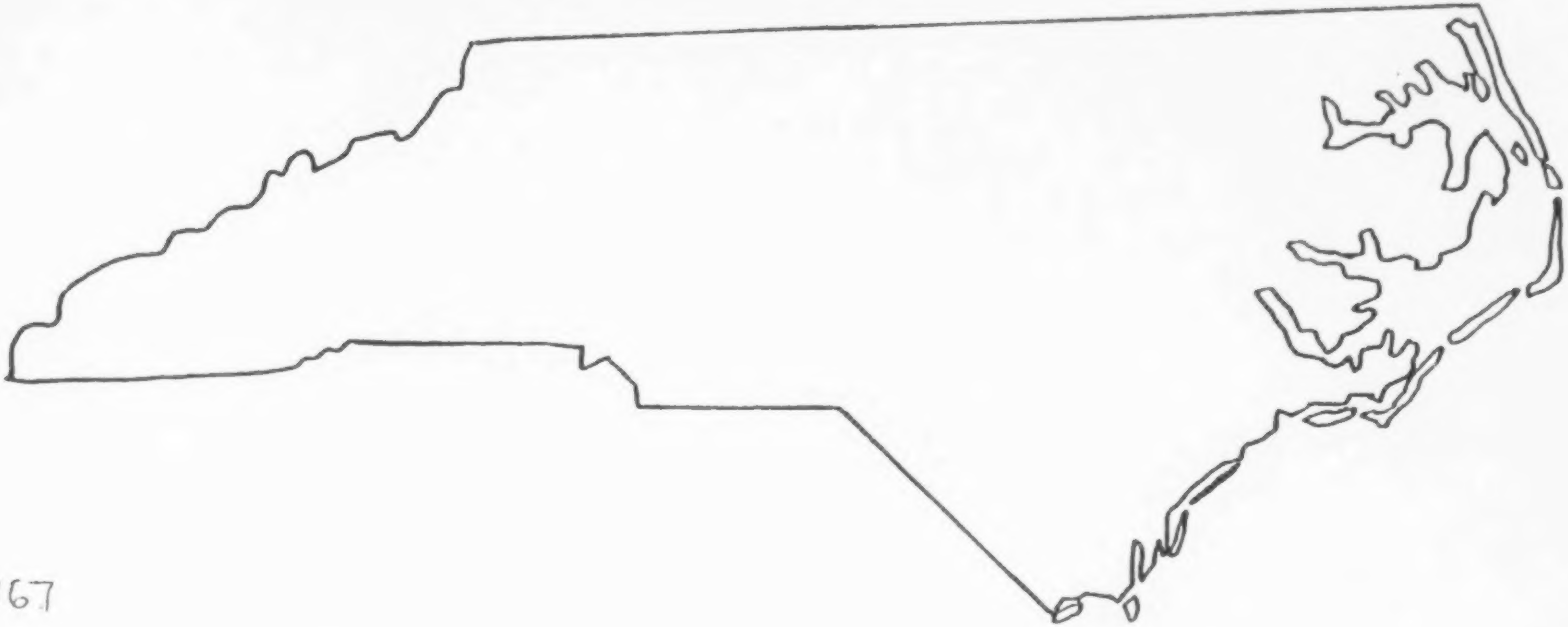
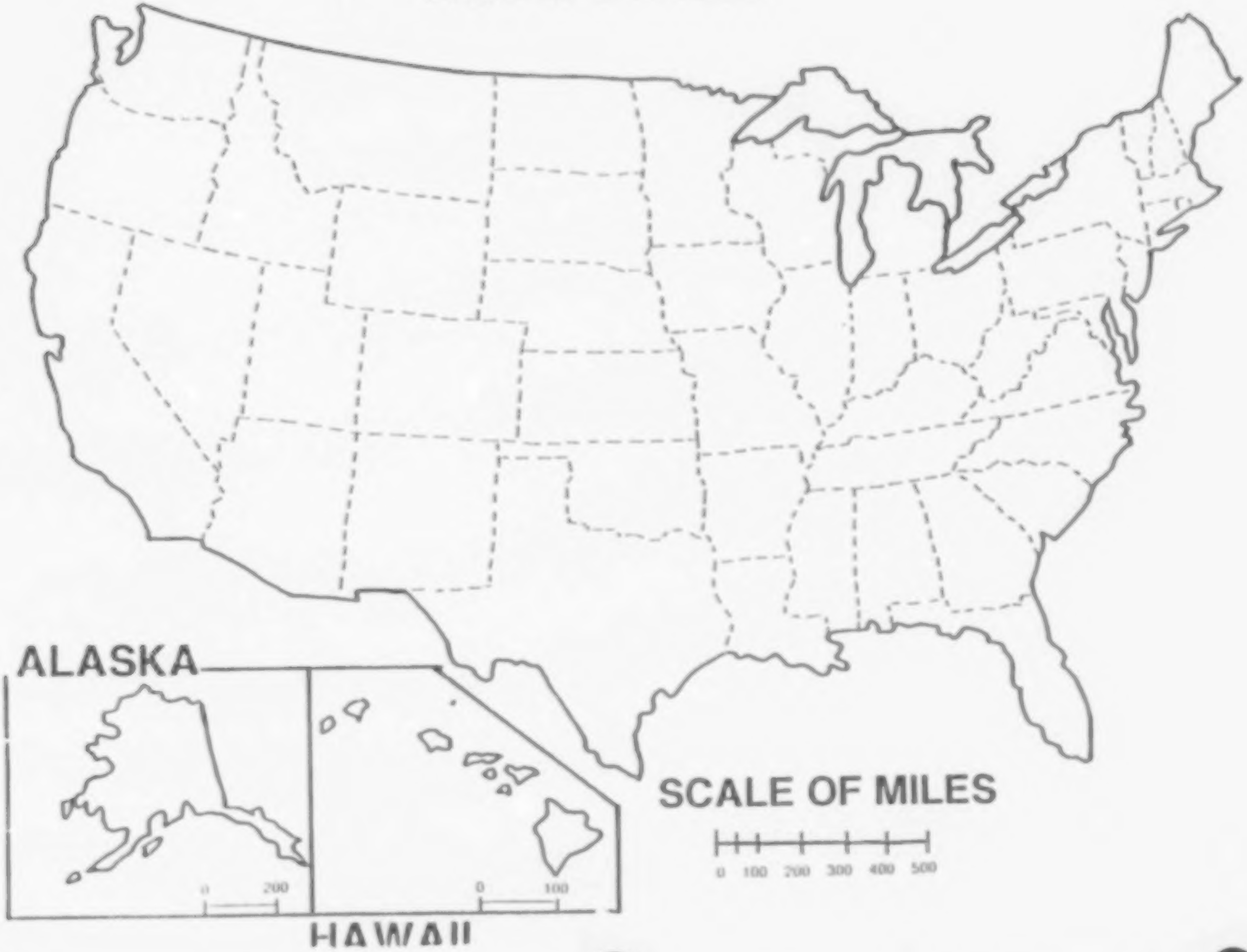
North Carolina



UNITED STATES


ALASKA
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200
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HAWAII
SCALE OF MILES
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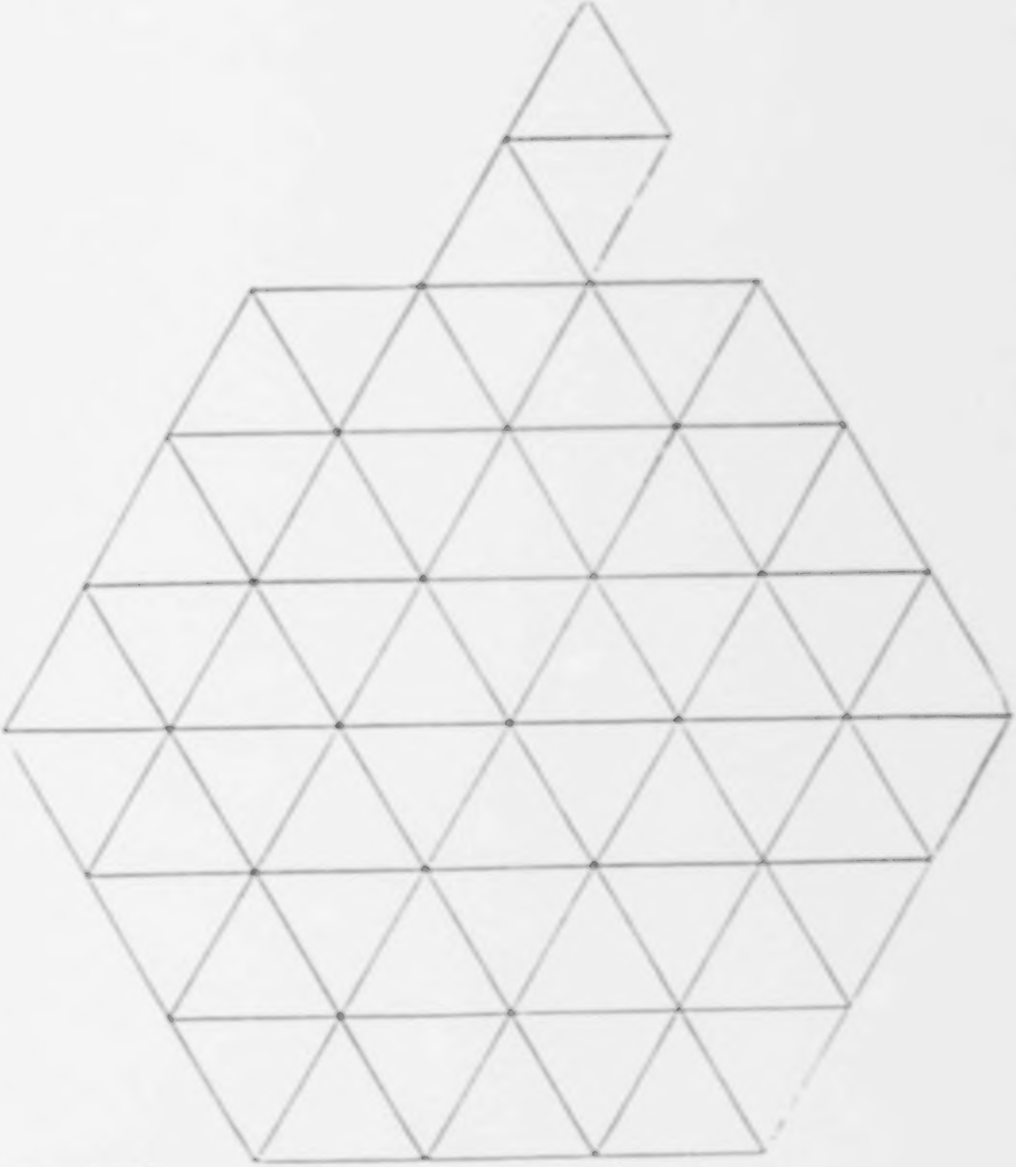
300
400
500

"APPLE-LICIOUS"



Pattern Apple

Materials: One sheet for each pair of students.
Pattern Blocks: Hexagons, Triangles, Trapezoids, Blue Parallelograms.

The object is to take turns placing one pattern piece at a time until the apple is covered. The person placing the last piece is the winner!

Variation: The person placing the last piece loses the game.

Accounting for Mathematics within Integrated Units

This worksheet is designed to help evaluate the mathematics in existing integrated units as well as in planning new units. In column A write the specific objectives/ skills/ concepts and put a check in the appropriate place in columns B, C, or D.

Unit Title____

	A Math Skills (Specific objectives)	B * New Skill (Instruction)	C # Maintenance (Practice)	D + Application (Independent)
Numeration				
Geometry				
Patterns Pre-algebra				
Measurement				
Problem Solving				
Data				
Computation				

Ask Yourself:

Is the mathematics listed in this unit significant and sufficient?
Are there worthwhile changes I can make to include more math?
Which goals are not involved that I need to include elsewhere?
Is my mathematics program well-balanced with instruction,maintenance, application?

* Needs time for instruction
# Needs supervision; may need reteaching
+ Applying understandings

HUNDRED CHART

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

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